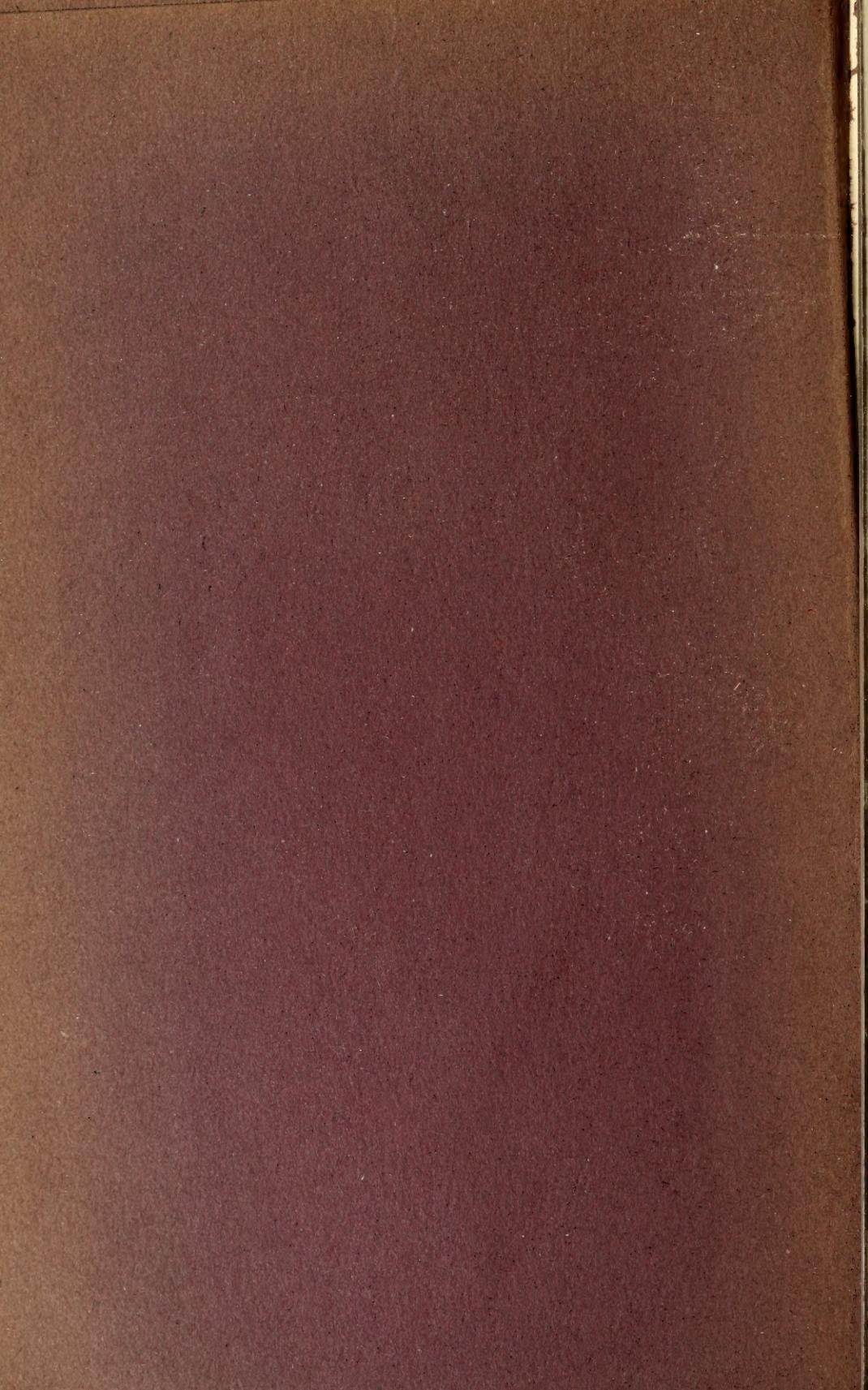
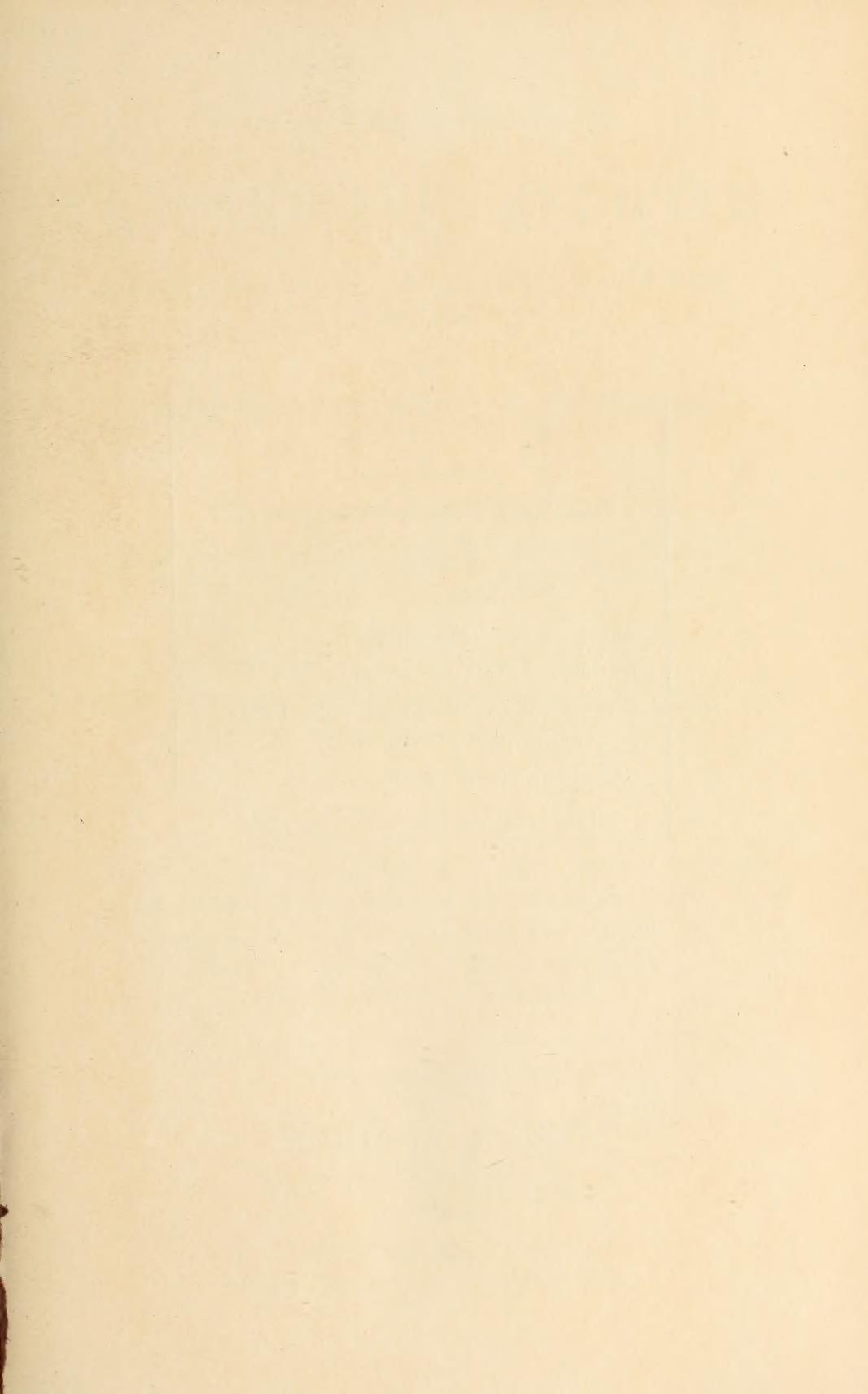


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# PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES  
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

EDITED BY

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VOLUME IV. DECEMBER, 1913

DISEASES OF THE DIGESTIVE TRACT AND ALLIED ORGANS, THE LIVER, PANCREAS  
AND PERITONEUM—DISEASES OF THE KIDNEYS—GENITO-URINARY  
DISEASES—SURGERY OF THE EXTREMITIES, SHOCK, ANESTHESIA,  
INFECTIONS, FRACTURES AND DISLOCATIONS, AND TUMORS  
—PRACTICAL THERAPEUTIC REFERENDUM.



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# PROGRESSIVE MEDICINE.

DECEMBER, 1913.

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## DISEASES OF THE DIGESTIVE TRACT AND ALLIED ORGANS, THE LIVER, PANCREAS, AND PERITONEUM.

BY EDWARD H. GOODMAN, M.D.

### DISEASES OF THE ESOPHAGUS.

**Carcinoma of the Esophagus.** Bassler<sup>1</sup> describes a method of plugging the cardiac end of the stomach with a rubber bag filled with water, and then, by means of a catheter, pouring bismuth into the esophagus. The rubber bag holds the bismuth in place until a picture has been taken, after which the pressure on the bag is released and the bismuth flows into the stomach. A cut of the author's instrument is given in the article. By this means, Bassler suggests that carcinoma of the gullet may be recognized earlier than it is at present.

Complete bilateral paralysis of the larynx occurred in a patient under Yorke's care.<sup>2</sup> This was due to complete involvement of the recurrent nerves in the cancerous growth, with complete destruction of the function of both nerves.

**TREATMENT.** Carcinoma of the esophagus is such a distressing and hopeless condition from the standpoint of the surgeon that the treatment falls largely in the province of the internist. Last year I abstracted (page 24) Kuester's able article wherein he advised the use of fibrolysin and soft-tipped bougies. Krienitz<sup>3</sup> has a suggestion for nourishing these patients which seems well worth a trial. He makes use of a combination stomach tube and stiff sound. The stomach tube is made with the end closed, but 5 cm. from the closed end, for a distance of 7 cm., there are

<sup>1</sup> Journal of the American Medical Association, 1913, vol. ix, p. 1283.

<sup>2</sup> British Medical Journal, 1913, vol. i, p. 116.

<sup>3</sup> Deutsch. med Woch., 1913, p. 1200.

20 windows, each 1 to  $1\frac{1}{2}$  mm. in diameter. The soft tube is swallowed until the obstruction is met with, then a mandarin is put in the tube converting the latter into a sound, which is passed through the stenosis until the fenestrated portion reaches the stomach. The mandarin is withdrawn, and the nourishment is poured through the tube into the stomach. After the feeding, the dilated esophagus above the obstruction is washed free of food rests.

Krienitz says such a method of feeding does away with the inflammation of the esophagus which always results when food is taken by mouth and decomposes in the dilated esophagus. Another advantage is the avoidance of violent acts of deglutition, such as accompany the endeavor to force food past an obstruction. Krienitz recommends that the feeding be given at eight, one, and eight, and that the food consist of thick soups, cream, and concentrated foods (Nährpräparaten).

**Ulcer of the Esophagus.** Two cases of peptic ulcer of the esophagus form the rare contribution of Watson.<sup>1</sup> This makes three cases which have come to my notice in the year, the other one by Miller, spoken of last year. In one of Watson's cases, there was a perforation into the left pleura; in the second case, no perforation occurred. In the first case, perforated gastric ulcer was diagnosed; in the second, gastric ulcer. Both cases exhibited acute abdominal symptoms, laparotomy was performed on both, but nothing abnormal discovered. Both cases ended fatally, and both occurred in males over forty years of age.

#### DISEASES OF THE STOMACH.

**Test-breakfasts.** Last year, I reviewed at length Mintz's article concerning test-breakfasts and gave in detail his objections and the method by which he proposed to avoid the inherent defects of the Ewald meal. He devised a new test-meal consisting of a solution of beef extract, which was said to be most valuable on account of its appetite-stimulating properties and uniform consistence. Details of the test-meal may be learned from PROGRESSIVE MEDICINE, December, 1912, page 29.

Hartiegan and Döri<sup>2</sup> have made comparisons of the Boas-Ewald test-meal and of the Mintz breakfast. The comparative figures will be found in the accompanying table. After a full discussion of these, the authors conclude that the data obtained do not warrant one in abandoning the Ewald meal, as, for all practical purposes, the end results are the same.

<sup>1</sup> British Medical Journal, 1912, vol. ii, p. 1182.

<sup>2</sup> Wien. klin. Woch., 1912, p. 2044.

Diagnosis.	Ewald-Boaz.						Mintz.					
	No. of cases.	No. of estim.	Total acid.	Average.	Free HCl.	Average.	Total acid.	Average.	Total HCl.	Average.	Free HCl.	Average.
Normal . . .	21	25	35-62	47	19-30	24	44-84	70	33-81	61	19-65	44
Hyperacidity . .	32	53	50-90	72	32-72	51	60-99	75	53-94	66	30-75	53
Hypoacidity . .	4	4	28-43	36	0-10	10	23-52	38	20-47	34	9-32	19
Achlorhydria . .	4	6	5-22	9	..	..	13-30	23	1-24	17		
Carcinoma . .	5	5	3-60	17	..	..	13-33	23	7-24	16		

**Influence of Mastication and Psychic Factors on the Composition of the Gastric Contents after a Test-meal.** The ordinary Ewald test-breakfast is such an unpleasant meal that it must be apparent to all that certain psychical factors, such as distaste for the breakfast, fear of the stomach tube, and physical factors, as chewing, must exert some influence. Last year I quoted at length from a paper by Mintz (see above), in which he discusses the equivocal results one obtains from giving an Ewald meal. Skray<sup>1</sup> has approached this subject rather differently, but with the same object in view, namely, to study the effect of certain mechanical and psychical factors on the gastric juice. He finds that excitement before and during the extraction of the gastric contents, also the quality of mastication, exert an influence on the acidity. Psychic factors cause a diminution, and insufficient mastication calls forth an increase of gastric acidity, but, of the two, the influence of the former is less pronounced. Insufficient chewing is followed by poor chymification despite the presence of hyperacidity, while in cases of anacidity or of subacidity, most thorough mastication does not improve the chymification. The character of the morsel swallowed, that is, whether large or small pieces, is without influence on the latter process.

**Gastric Motility.** Hausmann<sup>2</sup> recommends the use of a starch supper as a test of mechanical stagnation, that is, stagnation arising from pyloric obstruction. He gives rice or barley soup at bedtime, removes the same the next morning, and allows it to settle in a tumbler. The supernatant fluid is then poured off and to the residue a few drops of Lugol's solution are added, thoroughly mixed, and diluted with water. If there is much retention of the starch, the fluid will be colored blue. Hausmann believes that, when the starch is found only on microscopic examination, the retention is due to atonia or myasthenia gastrica, whereas the macroscopic detection of starch always indicates mechanical obstruction, presumably carcinoma. This very simple method is said by the author to be preferable to the currant method, which consists in

<sup>1</sup> Archiv f. Verdauungskr., 1912, vol. xviii, p. 495.

<sup>2</sup> Ibid., p. 530.

giving patients currants at bedtime, and examining the wash water the next morning for the seeds.

**Layer or Mixture of Food in the Stomach.** The question whether the food lies in the stomach in layers or as a uniform mixture is answered by Schilling<sup>1</sup> in favor of the mixture. In his article he brings into the argument Beaumont's work with his ungrateful patient, Alexis St. Martin, and in this connection I would call the reader's attention to the volume of *Life and Letters of Dr. William Beaumont*, by Dr. Jesse S. Myer. The book is a biographical sketch of the greatest value, and should prove interesting and entertaining reading for those interested in gastro-intestinal diseases.

**Origin of the Inorganic Chloride in Gastric Juice.** It is assumed that the inorganic chlorides, more generally known as acid salts, of the gastric juice following a test-meal are derived from the meal itself or from the neutralization of the hydrochloric acid by bases in the food. Hence it is that the inorganic chloride is generally regarded as lacking any physiological properties or devoid of any pathological significance.

This view, current in medical circles, is attacked by Singer.<sup>2</sup> Experimenting with the gastric juice obtained from the fasting stomach of a cat, he found the sodium chloride to be a variable quantity, and that it is related neither to the amount of "physiologically active" hydrochloric acid nor to the peptic power. He believes that the sodium chloride of the filtered gastric juice is in large part the result of an osmotic process in the stomach.

If this is so, and Singer's results seem to be conclusive, then changes in the stomach wall must be followed by more or less pronounced alterations in the amount of sodium chloride. One is justified no longer in regarding the inorganic chloride as meaningless from the clinical standpoint, and it is not unlikely that future work will attach a not inconsiderable significance to it.

**Influence of Salt on Hydrochloric Acid Secretion.** Benedict<sup>3</sup> insists that by reducing the salt intake the output of hydrochloric acid is diminished, a statement with which I am heartily in accord. At all events, the symptoms due to the hyperchlorhydria seem to be relieved when on a salt-poor diet. Because hypochlorhydria is not benefited by a salt-rich diet, Benedict says proves nothing. He remarks, "There is no more reason to expect a cure of hypochlorhydria from administering salt than of Addison's disease from administering adrenalin, or of leanness from administering fat." There is undoubtedly an anatomical basis for the hypochlorhydria, as is seen in achylia gastrica, and it is preposterous to expect salt to be manufactured by defunct glands any more than for a silk purse to be made from the ear of the proverbial sow.

<sup>1</sup> Arch. f. Verdauungskr., 1912, vol. xviii, p. 317.

<sup>2</sup> Lancet, 1913, vol. ii, p. 1663.

<sup>3</sup> Medical Record, 1913, vol. lxxxiii, p. 155.

**Tests for Free Hydrochloric Acid in the Gastric Content.** Fittipaldi<sup>1</sup> has modified the tropeolin test to serve for quantitative estimation of the free hydrochloric acid in the stomach content. Instead of mixing the stomach content and the reagent, he places a row of drops of the tropeolin solution on a porcelain dish. A minute drop of stomach content is then deposited in contact with a drop of the stain. At the point of contact there will be a color reaction, the tint ranging from purple, when little or no acid is present, to a decided lilac. The degree of acidity is expressed in terms of the decinormal soda solution, adding five to ten drops at a time and then testing again with the glass rod, taking up the droplet of stomach solution and depositing it on the cold stain. The standard for the test is the concentration when there is no further immediate color reaction on addition of the drop of stomach content. A tardy color reaction is not to be noted. The advantages of this technique are that the same stain serves for both the qualitative and quantitative tests. It shows free acid even when the Günzburg test gives a negative reaction. Heating the stain for the Günzburg technique gives a useful control test. The drop method may be used by artificial light, and it is particularly instructive when there are very small amounts of free acid present.

Another test along the same line of thought is described by Cippolina.<sup>2</sup> Two c.c. of filtered gastric juice are mixed with 0.5 c.c. anilin water, and four to five drops of the standard solution of sodium hypochlorite are added. A yellow tint, and the tendency of the water to become turbid, show that there is little, if any, acid present. With a persisting violet tint, the test should be repeated with gastric juice diluted to one half with water. Persistency of the violet tint shows the presence of hyperchlorhydria. I cannot see what particular advantage this method enjoys over the ordinary method of titrating with a decinormal sodium hydrate solution. The test is supposed to be extremely sensitive, even a fraction of a milligram turning the scale in favor of the yellow or violet tint, but this has little, if any, practical significance.

A method of determining the presence of free hydrochloric acid without using the stomach tube is suggested by Friedrich. He gives the usual test-meal, and at the end of twenty minutes he gives his "gastrognost," allows it to remain in the stomach for thirty minutes and then withdraws it. This gastrognost, despite its name, is really an innocent little toy, consisting of a metal capsule contained in a gelatine shell. To one end of the former is attached a string, and to the other is fastened a thread saturated with congo. The gelatine capsule is eventually dissolved, and the free HCl changes the congo thread blue, the metal capsule is withdrawn and, presto, free hydrochloric acid is determined. The closing sentence of this scientist's article is

<sup>1</sup> Abstract, Journal of the American Medical Association, 1913, vol. ix, p. 1271.

<sup>2</sup> *Ibid.*, 1912, vol. lix, p. 978.

especially happy in its expression of paternal pride: "Ich bitte Sie, sich der Methode anzunehmen, ich kann Ihnen versprechen dass Sie oft Ihre Freude daran haben werden."

Opitz,<sup>1</sup> not to be outdone by his scientific confrère, admits that he has used a similar method for the past two and a half years, but prefers a perforated hard rubber torpedo-like object, which he fills with congo paper and litmus, packs it in an oblate and sends on its way, only, however, to be withdrawn by means of a string.

A strain from the *Rubaiyat* recurs and will not down:

"What, without asking, hither hurried Whence?  
And, without asking, Whither hurried hence?  
Oh, many a Cup of this forbidden Wine  
Must drown the memory of that insolence."

**Diagnostic Significance of the Quantitative Estimation of Pepsin.** The latest writer, Singer,<sup>2</sup> believes that by estimating the amount of pepsin in the gastric juice one is able to obtain information helpful from the standpoint of diagnosis. Some years ago, Farr and the writer<sup>3</sup> made some clinical studies, but we were convinced that apart from distinguishing neurosis and chronic gastritis on the one hand, from carcinoma and achylia on the other, pepsin determinations had little significance. We found marked variations in certain conditions, as does Singer, but these were so inconstant as to be untrustworthy in the differentiation of these conditions.

**Rennin.** The ever-recurring question of the significance of the gastric ferments is treated of by Rutimeyer<sup>4</sup> in an article which so bristles with classifications and technical descriptions that its purpose is thereby practically defeated. This purpose is, avowedly, to study the significance of the ferments, especially the milk coagulating ferment, and to present to the practitioner these results in a definite and easily understandable manner. The only result obtained was, if the rennin is as low as 1 to 10 (Boas' method), that the case is probably that of achylia gastrica and not carcinoma. In the latter condition, the ferment is generally larger in amount (1 to 40 to 1 to 320) while the highest figures are found in nervous anacidity.

**Trypsin in the Gastric Contents.** In the *Journal of the American Medical Association*, 1913, vol. lx, p. 1843, is an abstract of some work done by Kriloff on the presence of trypsin in the stomach contents of patients with various gastro-intestinal disorders. Positive results were obtained in 63.3 per cent. of the cases. In achylia gastrica, the trypsin rate was found to be high, but there was no trypsin found in the cases

<sup>1</sup> *Deutsch. med. Woch.*, 1913, p. 114.

<sup>2</sup> *Deutsch. Arch. f. klin. Med.*, 1913, vol. cxi, p. 188.

<sup>3</sup> *Archives of Internal Medicine*, July, 1908.

<sup>4</sup> *Archiv f. Verd. kr.*, 1912, xviii.

of hysterical achylia and gastralgia. With cancer, trypsin is always present, especially with cancer of the pylorus and in other cases of pyloric stenosis. Trypsin was present in chronic gastritis, but missing with cirrhosis of the liver, and greatly diminished with gastric ulcer. Parallel tests for trypsin, pepsin, and the acidity of the stomach showed that the higher the trypsin rate, the lower is that of acidity and of pepsin. As a rule, the amount of trypsin is small.

**Diastase in Urine.** The question of the clinical importance of the estimation of the diastatic ferment in the urine is reviewed by Neumann.<sup>1</sup> Personally, I feel that there is little knowledge to be derived from the study of this ferment, and although Neumann is not quite so pessimistic his article brings forth nothing which leads me to change this opinion. In health, there are great variations which are continually being met with, these being irrespective of food. Psychic influences do play some role in the production of these changes. In diabetes, the diastase is said to be more or less diminished, and moderate diminution is held to be of favorable prognostic significance(?). In diseases of the pancreas, an increased amount of the ferment was found, and this fact Neumann thinks can be used to advantage, although febrile conditions, notably typhoid, have a similar increase, though not of so great degree.

**Pepsin in Urine.** Another paper is by Tachau,<sup>2</sup> who was inspired in his research by the great difference in opinion concerning the value of pepsin in the urine. This difference of opinion may be found on page 34 of my previous contribution to PROGRESSIVE MEDICINE, 1912. Tachau, after a study of 78 cases, concludes that the behavior of the urinary pepsin offers nothing of diagnostic importance. Diminution of the ferment is no criterion of any gastric disease, nor does a normal amount of the ferment exclude the presence of a gastric trouble. As far as carcinoma is concerned, the test is absolutely valueless. These conclusions of Tachau coincide with those which I deduced from my research.<sup>3</sup>

**Cause of Back Flow of Intestinal Juice, Bile, and Pancreatic Juice into the Stomach.** By means of the *x*-ray, Schlesinger<sup>4</sup> has studied this problem most thoroughly, and concludes that the back flow of intestinal juices is not an artificial phenomenon or an accidental regurgitation, but is, under certain circumstances, a definite process which takes place both during digestion and apart from it. The prime cause of this backward flow is to be seen in a gastropyloroduodenoptosis, with patulous pylorus. The tone of the latter must have been weakened, so that its power of contraction is lessened, and with these factors there is usually a dilatation of the pyloric part of the duodenum, which serves as a reservoir. The presence of intestinal juice often causes

<sup>1</sup> Deutsch. Arch. f. klin. Med., 1913, vol. cxi, p. 164.

<sup>2</sup> Zeitsch. f. klin. Med., 1912, vol. lxxvi, p. 167.

<sup>3</sup> New York Medical Journal, April 22, 1911.

<sup>4</sup> Zeitsch. f. klin. Med., 1912, vol. lxxv, p. 314.

symptoms resembling hyperchlorhydria, and it is this back flow of bile, etc., which accounts for the difficulty in curing cases of gastrophtosis.

**Position and Form of the Normal Stomach.** A very startling article under this heading is from the pen of Paterson,<sup>1</sup> who believes the normal stomach is, in the majority of cases, a four-chambered organ composed of the cardia and fundus, pyloric vestibule, pyloric antrum, and pyloric canal. These divisions are illustrated in the accompanying cuts.

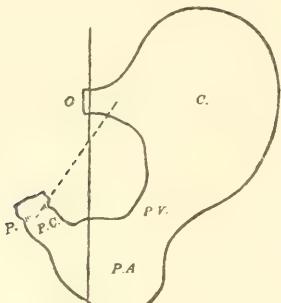


FIG. 1

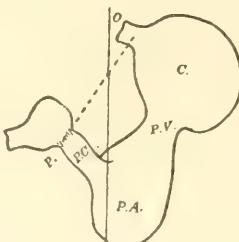


FIG. 2

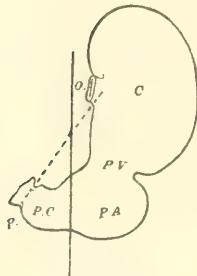


FIG. 3

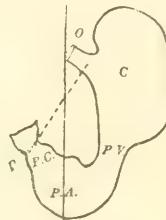


FIG. 4

Twenty stomachs taken consecutively from subjects in his dissecting room showed this four-chambered form. In Paterson's article will be found other cuts illustrating variations from this normal type, with descriptions of all. A striking statement, and one which will be scarcely believed, is that an hour-glass contraction of the stomach is not necessarily pathological, it being the form most commonly met with in the dissecting room.

The reader will find it very interesting to compare Paterson's sketches with a photograph which accompanies Stopford's article,<sup>2</sup> immediately following Paterson's. Stopford claims that his picture depicts the shape of the normal stomach as shown in the *x*-rays. He insists that the specimens found in the dissecting room are "distorted" and that they are untrustworthy and unreliable, but despite this criticism one

<sup>1</sup> British Medical Journal, 1913, vol. i, p. 1205.

<sup>2</sup> *Ibid.*, p. 1206.

can not fail to find a certain resemblance between his specimen and those of Paterson.

**Gastric Juice and Infections.** That digestion is markedly disturbed during infections has been known since the time of Hippocrates, who recommended that fever patients be deprived of all nourishment. The belief is still held, however, and finds expression in the homely phrase, "Stuff a cold and starve a fever." A certain amount of work has been done on the subject, but this so far is very incomplete. We know, for instance, that there is a diminution of free hydrochloric acid and in severe cases a disturbance of gastric motility. Also, the iodine test for resorption from the stomach shows delay of this function. Owing to the obvious impracticability of conducting researches in man, Meyer<sup>1</sup> made miniature stomachs in two dogs, and then injected certain bacteria. In the first experiment, a pure culture of staphylococci was used, and although the fever was mild, 39.7° C., and lasted but two days, there was an immediate disturbance of gastric function. This disturbance was expressed in a marked diminution of gastric juice, and also a delayed secretion of the same. The higher the fever, the more pronounced were these changes. The question whether it was the effect of the fever or the effect of the bacterial agent was decided by producing an aseptic fever by means of oil of turpentine. In the latter case, the gastric changes were identical with those found in bacterial pyrexia.

**Gastric Juice in Graves' Disease.** A study of the secretory disturbances of the stomach in Graves' disease has been made by Wolpe<sup>2</sup> on sixteen patients suffering with this malady. The article is especially commendable as it permits of one getting at the kernel of the nut without much cracking of the shell, the paper being brief and very much to the point. Results are concisely given in two tables, but it is the author's conclusions which interest us. In the majority of cases there is hypochylia or achylia. An acidity and apergia are more intense when the classical picture of the disease is most nearly imitated. Of the ferments, the pepsin is reduced the most, leading to great disturbance of the chyme formation. The achylia gastrica seems to become progressively worse the longer Graves' disease has existed, leading eventually to true atrophy of the gastric mucosa (*Anadenia ventriculi*). Wolpe thinks the intestinal derangements are due to gastric disturbances, but certain other influences from nervous sources cannot be ruled out. The practical application of Wolpe's work seems to be, that one should select, in such cases, a diet which will be perfectly digested by a stomach whose functions are so markedly impaired.

Kolb<sup>3</sup> recalls Schmieden's case of severe intestinal symptoms, so

<sup>1</sup> Berl. klin. Woch., 1913, p. 775.

<sup>2</sup> Deutsch. Arch. f. klin. Med., 1912, vol. cvii, p. 492.

<sup>3</sup> Münch. med. Woch., 1912, p. 2669.

severe, in fact, that the diagnosis of tuberculosis or cancer was made by the attending physician. Kolb reports a similar case who had had, for the last fifteen years, three and four bowel movements a day. There was a visible thyroid enlargement but without any other signs of Graves' disease, and on account of symptoms of compression, operation was advised. Examination of the extirpated gland revealed the picture of Graves' disease. Since the operation, the patient has had regular, normal, bowel movements.

According to Sattler, 30 per cent. of the cases of Graves' disease have diarrhea, and Kolb quotes extensively from authors to show that this may be the *only* symptom. He rightly urges that every diarrhea, which does not yield to internal medication, should be studied from the standpoint of an incipient thyroid disease.

**Gastric Secretion and Arthritis.** The relation which gastric secretion bears to rheumatoid arthritis is made the subject of a research by Woodward and Wallis<sup>1</sup> with the result that in ten typical cases of chronic arthritis (rheumatoid), the hydrochloric acid was low or even absent. The authors hold that the absence of hydrochloric acid in nine of the ten cases, justifies the expectation that it will be found in almost every case of rheumatoid arthritis, and also explains the frequency with which dyspepsia is encountered in such cases.

Based on this small number of cases, Woodwork and Wallis suggest that hydrochloric acid be administered in the following form:

Although they take cognizance of the deceptive results which treatment of any chronic condition is likely to produce, they assert that with this prescription dyspeptic symptoms were much ameliorated, and that the articular pains had entirely disappeared.

Any treatment which will help sufferers with this lamentable chronic affection should receive some consideration, although basically the treatment totters somewhat. To assume that, because there is deficient hydrochloric acid in rheumatoid arthritis, to this deficiency must be assigned the cause of the disease, is a conclusion the authors reach with one gargantuan stride, but which we must needs arrive at with more moderate and with more tempered speed. Is the an acidity of pernicious anemia the cause of pernicious anemia, and are we so near the solution of the cancer problem that we have but to regard the hyperacidity as the etiological factor? The dangers of believing *post hoc ergo propter hoc* are forever lurking near an original idea or piece of research, and

<sup>1</sup> *Lancet*, 1912, vol. ii, p. 542.

one must beware of following the line which this adage describes so well. In no place do the authors, whose gastric analyses are so completely done, seem to see the other side of the question, the effect of rheumatoid arthritis on the gastric secretion.

**Gastric Juice after Cholecystectomy.** The observation, which is not at all novel, that patients who have undergone operations for removal of the gall-bladder, not infrequently return with gastric or intestinal symptoms, led Hohlweg<sup>1</sup> to a study of the gastric juice in such patients. He had an unusual opportunity to study 42 cases, and being astonished at the hydrochloric acid deficiency in 83.3 per cent. he was able to show that a similar phenomenon could be induced in dogs after cholecystectomy. Without minimizing the frequency and perhaps importance of postoperative adhesions, he is nevertheless inclined to think that low amounts of hydrochloric acid may be held accountable for many symptoms which follow removal of the gall-bladder. His other conclusion, that hypochlorhydria is an important sign of gall-bladder disease, is not so valuable, as there are so many conditions associated with low acidity that hypochlorhydria of itself is of little moment.

The reader is referred to the article by Dagaew<sup>2</sup> in which the effect on the digestive processes of gastroduodenostomy, and gastrojejunostomy and gastrectomy is fully discussed.

**Gastric Ulcer.** **ETIOLOGY OF GASTRIC ULCER.** It is of prime importance, in searching for the etiology of gastric ulcer, to comprehend the reason why the stomach, under normal conditions, does not digest itself. There can be scarcely any doubt but that gastric ulcer is a digestion ulcer, for it arises in the stomach only in those places which are in contact with the active gastric juice. Katzenstein<sup>3</sup> some years ago, produced a gastro-enterostomy and then injured the mucous membrane in two corresponding places, in the stomach and intestine. In two days the gastric ulcer was healed, while the intestinal ulcer was in the same condition as before. He concluded that injury was not the only factor in the causation of a gastric ulcer but that, in addition, gastric juice was required. Furthermore, he concluded that the intestinal mucous membrane behaves differently from the gastric mucosa. This is in direct contradiction to Neumann's teaching that all living tissue behaves in the same way toward the digestive juices.

Katzenstein sought to learn whether there was not an inherent property in living tissue of various kinds whereby they reacted in different ways to the digestive juice. He implanted in the stomach portions of the stomach, duodenum, small intestine, and spleen, without disturbing in the least the mesenteric blood supply, and discovered that the stomach and duodenum were not attacked while the other

<sup>1</sup> Deutsch. Arch. f. klin. Med., 1912, vol. cviii, p. 255.

<sup>2</sup> Mitt. a. d. Grenzgeb. d. Med. u. Chir., 1913, vol. xxvi, p. 176.

<sup>3</sup> Arch. f. klin. Chir., 1913, vol. c, p. 939.

structures were digested. From this work he deduced that living tissue in the normal individual can be digested by the stomach, and that the tissues which produce the gastric juice, or are bathed continually in it, are resistant on account of an "Anpassungsvorgang."

An interesting experiment revealed the fact that albumin *in vitro* is not digested by active gastric juice provided a portion of gastric mucosa is put in the tube at the same time. He took four test tubes containing fresh juice and in each put a Mette tube. One tube acted as a control, one contained mucous membrane of the small intestine, one the mucosa from the large intestine, and the third a portion of the stomach wall. In the control tube, the albumin was completely dissolved, as was the case with the tube containing the small intestine. Slight inhibition of digestion was observed in the large intestine tube, while the gastric mucosa almost entirely prevented the digestion of the albumin. This, to Katzenstein, is a proof that the resistance of the gastric mucosa to digestion does not lie in its vitality, as the dead (he undoubtedly means *ex corpore*) mucosa contains stuffs which work against the digestive action of the gastric juice.

Katzenstein reviews, in an interesting and brief way, the various theories of the resistance of the stomach to its own digestive juice. He is not a supporter of Hunter's "vitalistic theory" but rather agrees with Claude Bernard that living tissue may be digested. The first requisite is an active gastric juice, and by lessening the latter's digestive power by vegetable food and atropine, or by increasing its activity by a meat diet, the digestion of tissue (intestine) implanted in the stomach may be materially accelerated or retarded.

The resistance of the duodenum and stomach to digestion when implanted in the stomach, is held by Katzenstein<sup>1</sup> to be due to the presence of antipepsin. He believes that the stomach and duodenum pick out the antipepsin from the circulatory blood in the same way that the renal epithelium does with the urinary substances. If Katzenstein is correct in this assumption, the next question naturally arises, Can one, by destroying antipepsin, produce in the experimental animal a gastric ulcer which is similar to that seen in man?

EXPERIMENTAL PRODUCTION OF GASTRIC ULCER. Katzenstein,<sup>2</sup> working on the theory that antipepsin plays the leading role in the production of gastric ulcer, provided a defect in the mucous membrane coexists, reduced the amount of antipepsin in the blood and in the stomach, and was able to produce a typical ulceration. He states that a gastric ulcer is a result of a local injury of the stomach wall, which does not heal on account of the disturbance of the normal pepsin-antipepsin relation in the gastric juice, whereby the pepsin is increased and the antipepsin diminished in amount. He further states that if this conclusion is correct, one should be able to produce, in a rabbit

<sup>1</sup> Arch. f. klin. Chir., 1913, vol. ci, p. 1.

<sup>2</sup> Ibid., vol. ci, p. 1.

whose stomach contains no pepsin and no antipepsin, an ulcer by the action of normal gastric juice. This he has succeeded in doing by feeding the animal 100 c.c. of canine gastric juice (rich in pepsin and antipepsin) a day. On the fifteenth day the ulcer perforated, and the animal died.

Katzenstein's two papers make fascinating and entertaining reading, and when his experimental data are carefully studied and considered, one must admit he makes out a good case for the plaintiff.

**ORIGIN OF CHRONIC ULCER OF THE STOMACH.** Bolton<sup>1</sup> believes every chronic ulcer develops from an acute ulcer. He is careful to draw distinctions between erosions and ulcerations. From the point of view of morbid anatomy, an erosion is regarded as a superficial ulcer, but from the standpoint of general pathology, a distinction can be made. For instance, in acute infection, purpuric conditions, and severe anemias, there may be profuse hemorrhage from the gastric mucous membrane in the absence of any ulceration whatever. At autopsy, there may be found superficial erosions looking as if the upper layers of the mucous membrane had been rubbed off. These erosions are mechanically produced by the escape of blood from the surface, and are comparable to abrasions of the surface. Bolton prefers to reserve the term "erosion" entirely for this condition and distinguishes it from "ulcer," which he holds is produced by the gastric juice acting upon a damaged portion of the mucous membrane.

**FORMATION OF ACUTE ULCER.** Although few opportunities have been afforded to study the processes leading to the formation of acute ulcer, still we know that losses of substance may arise in three ways: (1) By local necrosis. (2) Intestinal hemorrhage into the mucous membrane. (3) By inflammation of a lymphoid follicle of the mucous membrane.

The initial damage having taken place, the part early falls a prey to the gastric juice, the dead tissue is removed at once, and an acute ulcer results. Bolton believes there are several varieties of acute ulcer from the standpoint of general pathology, while, from the standpoint of morbid anatomy, these varieties cannot be easily recognized.

*Fate of the Acute Ulcer.* 1. Normal Healing. In the majority of cases the ulcer begins to heal at once, and within three or four weeks, according to the size of the ulcer, the scar is covered with embryonic mucous membrane. The causes of acute ulcer are: (a) acute infections and intoxications; (b) chronic infections; (c) diseases of other organs, namely, inflammation of the appendix. Usually the ulcers occurring in the first group do not show scar formation, while in the other groups, open ulcers and ulcers with scar formation are found side by side. There seems to be a definite tendency for gastric ulcer to heal, and to heal readily, which is important from the standpoint of the internist.

<sup>1</sup> Quarterly Journal of Medicine, 1911-1912, vol. v, p. 429.

2. Delayed Healing. Bolton believes that when the healing of an ulcer is delayed, it is because of the retention of food. In the event of the latter occurring, the base of the ulcer is inclined to become necrotic from the prolonged action of the gastric juice, so that the epithelium grows with greater difficulty.

3. Extension of Acute Ulcer. An acute ulcer spreads in two directions, laterally by extension in the mucous membrane, and also in depth, and in this extension two processes are at play—a destruction process and a secondary inflammatory process which causes thickening, and hence accounts for the chronicity. Bolton describes in great detail the picture of the extension of an acute ulcer.

4. Symptomatology. The more recent the ulcer the more closely do the symptoms resemble those of acute ulcer, while the older and the more thickened it is, the more like those of chronic ulcer do they become. Bolton is certain that the presence of acute ulcer in the stomach is not necessarily associated with symptoms, and he says, in fact, that it is probably true that most acute ulcers give rise to none. "The stomach may be riddled with ulcers, and yet the patient may complain of no symptoms." In a great many cases, hematemesis is the first symptom to be noted, and rarely perforation, but both must be regarded as accidental complications of acute ulcer. Pain is present in but a small proportion of cases. The "indigestion" which has been complained of for a long while is explained by Bolton as follows: (1) Indigestion and ulcer may both be the result of a common cause. (2) The acute ulcer of a different origin may have developed in the subject of indigestion. (3) The cause of "indigestion" may promote the propagation of the ulcer or prevent healing.

The symptomatology of chronic ulcer comprises long standing indigestion, pain, and vomiting. The factor of chronicity of an ulcer is the thickening, but it is impossible clinically to define at just what moment the ulcer has begun to thicken. All that can be said is that pain and other symptoms of ulcer usually commence when a certain amount of thickening is present. If true ulcer pain has been present for five or six months, then the diagnosis of chronic ulcer is justifiable.

As far as the treatment is concerned, if the patient be put to bed with a diet of milk and raw eggs, symptoms disappear as a rule and healing begins. The more chronic the ulcer, the more difficult the healing, due to the necrotic condition of the base of the ulcer.

Ophüls<sup>1</sup> reviews the literature pertaining to the relation between vascular lesions and gastro-duodenal ulceration, and arrays himself as one of the supporters of this belief. He shows pictures which exhibit arteriosclerotic changes in the arteries of the stomach, and, from his work and the work of others, he concludes that the most common type of gastric ulcer is the arteriosclerotic ulcer in persons over thirty years

<sup>1</sup> Archives of Internal Medicine, 1913, vol. xi, p. 469.

of age. In individuals younger than this, a class of ulcer is seen which is probably due to local endarteritis, and he distinguishes a third class which is due to embolism or thrombosis.

An attempt is made by Stoerk<sup>1</sup> to see in lymphatism a causal factor in the production of gastric ulcer. He describes carefully what he understands to be the cardinal symptoms of a pronounced lymphatism, that is, those objective signs which may be found in the living subject. Thirty patients, definitely proved to have ulcer, were examined, and of these, but thirteen elderly individuals failed to show signs of lymphatism. This is no proof that lymphatism was not present, for he reminds us of the difficulty of the diagnosis, which is, furthermore, made still more complicated by the recognition of an occult form of the disease.

Of the cases which came to autopsy (these were not the cases which had been examined clinically), twenty-four more or less recent ulcerations were discovered, and of these the protocols distinctly recorded status thymicolymphaticus as being present.

In five other cases, certain features indicating a like condition were noted, and Stoerk says when one considers that not every pathologist is familiar with the lesser grades of the so-called lymphatic state, it is very probable that it was not looked for in many cases.

Stoerk concludes that the lymphatic temperament is an anomaly of constitution, which tends to prevent the healing of a gastric ulcer.

DIAGNOSIS OF CHRONIC ULCER OF THE PYLORUS. In the diagnosis of this condition, Faulhaber<sup>2</sup> lays great emphasis on six cardinal signs: pain, hemorrhage, vomiting, periodicity of pain, continuous hypersecretion, pylorospasm. The last three give information particularly concerning the situation of the ulcer, and these are discussed in detail.

1. *Periodicity of Pain.* In many chronic ulcers of the stomach there are periodic outbreaks of pain, between which the patients are free of all distress for weeks and months. These are *not* to be considered as "healing procedures," as Crämer and Minkowski have suggested. Faulhaber holds that the periodicity of pain, while occurring at times in all ulcers situated in various places in the stomach, nevertheless is most frequently met with in ulcer of the pyloric region. He even goes so far as to assert that it is constantly present in this form. Especially characteristic are the long time patients will go without suffering any discomfort.

2. *The importance of continuous hypersecretion* in the diagnosis of ulcer is not new, but Faulhaber says it is most likely to occur in pyloric ulcers. Of his thirty-two patients, it was a feature in twenty-eight cases. In all, the amount (fasting stomach) recovered exceeded 20 c.c., ranging from 20 to 200 c.c., and in all cases there was hyperacidity.

<sup>1</sup> Deutsch. med. Woch., 1913, p. 496.

<sup>2</sup> Münch. med. Woch., 1913, pp. 915 and 983.

3. *Pylorospasm.* This condition is recognizable, not by the finding of a tumor (Schnitzler, etc.), but by the results of the spasm, *i. e.*, delayed motility. The phenomenon of a muscular spasm of the pylorus was suggested first by Kussmaul as an explanation of the retention seen in cases having no organic stenosis of the pylorus. Although Strümpell questioned this, and although the contraction of the pylorus has never been witnessed, yet it is generally recognized as existing. Some authors believe such a spasm is caused reflexly from a wound in the mucous membrane of the stomach, such as ulcer, while others hold that the hypersecretion is the cause. Krehl steers a middle course and believes both are possible causes, but Faulhaber thinks the reflex spasm from an ulcer is the only correct explanation. The test of impaired motility is the finding of macroscopic stagnation, and it remains to determine whether the stenosis is organic or functional, a task none too easy. Of practical importance in the diagnosis of a functional hindrance is the variability of the findings, one time macroscopic stagnation, another time microscopic retention, and Faulhaber thinks sarcinæ speak for organic stenosis, their absence for spasm.

This is as much aid as can be expected from the clinical side, and the *x-ray* must be called to our assistance.

Faulhaber diagnoses delayed motility first degree (six hour retention), when there is a well-marked peristaltic wave shown in the picture, food having been given six hours previously. The author goes one step farther, and insists that such a picture indicates not only retention, but the presence of an ulcer in the region of the pylorus.

Such, then, are the ear-marks of an ulcer situated at the pylorus: pain, hemorrhage, vomiting, but especially, periodical outbreaks of pain, continual hypersecretion, and pylorospasm. The last named is found only in pyloric ulcer, and leads to a moderate grade of deficient motility, easily recognizable with the *x-ray*.

Faulhaber makes the statement, that since internal treatment of ulcer is a failure in more than 66.6 per cent. of the cases, ulcer must be regarded as a surgical disease. This will hardly meet with the approval of internists who regard ulcer of the pylorus as distinctly within the scope of their activities, and who never recommend operation until all medical treatment has proved inefficacious. That medical treatment is effectual in more than 33.3 per cent. of the cases may be seen under the heading "Result of Medical Treatment." There, Parilä has shown that 86.7 per cent. of 120 patients were completely cured or very much improved.

**HYPERSECRETION WITH GASTRIC ULCER.** Kemp<sup>1</sup> comments on the scant attention that has been paid Rubow's assertions in regard to the importance of large amounts of very acid contents after a test-meal as a sign of gastric ulcer. When the motor function is excessive, the contents of the stomach are passed along so quickly that the amount of

<sup>1</sup> Abstract, Journal of the American Medical Association, 1912, vol. lix, p. 1586.

gastric juice secreted often seems to indicate abnormally increased secretion, when this is not the case. On the motor functioning depends whether the contents will be small in amount and extremely acid, or large in amount and moderately acid. The only sure sign of hypersecretion is a very large and very acid gastric juice one hour after a test meal. There should be, in such cases, at least 120 c.c. of contents with an acidity of 80 or over.

Kemp has examined 550 patients with various stomach affections, which he groups as ulcer, suspected ulcer, and simple dyspepsia.

The abstract in the *Journal* does not quote actual figures, but one is led to believe that in ulcer there was great hypersecretion with hyperacidity (over 85 c.c.  $\frac{n}{10}$  HCl) and in the other conditions mentioned, these features were lacking.

*Combined Hydrochloric Acid in Gastric Cancer.* Grund,<sup>1</sup> following the lead of Reissner, has undertaken a research on the behavior of the combined hydrochloric acid in carcinoma of the stomach. Reissner,<sup>2</sup> according to Grund, made studies of the free acid and total acidity and total chloride, also examinations of the combined chlorine, and found, that despite the lack of hydrochloric acid such as is usually found in cancer, the total amount of chlorides was not materially lowered. This he explains as being due to increase of chlorine held in combination with alkalies. Whereas in health there is 80-100 parts total chlorides with 24-40 parts as combined acid, in cancer the total acidity was 60-80, and the fixed chloride amounted to 40-70. Reissner offers two possibilities for this phenomenon, either the carcinomatous stomach excretes the chlorine in this form, or else there is an alkaline juice poured out from the tumor which combines with the hydrochloric acid, and he favors the latter hypothesis.

Owing to the fact that Reissner's work has received general recognition despite the absence of any subsequent research pro or con, Grund has studied this subject anew. He washed the stomach out well before giving his test-meal, the latter was made as nearly chloride-free as possible, and the swallowing of saliva (which contains 14 per cent. chloride) was prevented. Using these extreme precautions on carcinomatous patients, patients with various gastric diseases, and on normal subjects, he arrived at conclusions diametrically opposed to Reissner, namely, that the fixed or combined chloride was not increased, due to the outpouring of an alkaline juice, but there was a deficient production of acid as is seen in achylia. From the standpoint of diagnosis, Reissner's findings or suggestions are valueless.

**ANTYPEPSIN IN GASTRIC ULCER.** In the section devoted to the experimental production of gastric ulcer, I quoted at length an article by Katzenstein, who endeavored to show that the stomach resisted its

<sup>1</sup> Deutsch. Arch. f. klin. Med., 1913, vol. cix, p. 560.

<sup>2</sup> Zeitsch. f. klin. Med., 1903, vol. xliv, p. 71.

own digestive juices by the antipepsin of the blood, which was picked out by the epithelial cells of the stomach for their defence. This idea is not an original one, but was advanced by Frentzel,<sup>1</sup> in 1891.

Antipepsin in the blood has been carefully studied since that time, as may be learned from Lieblein's paper<sup>2</sup> from which I quote. The latter has found in health and in disease, except ulcer, a constant amount of antipepsin which was not departed from in any considerable degree. In ulcer there was no constancy, sometimes there was a large amount, and sometimes a low amount. The only inference to draw from this, is, that in ulcer, there seem to be periods when the blood possesses a very small amount of antipepsin. Were this period to coincide with the beginning of every gastric ulcer, then the significance could not be denied. Again, if an ulcer, which had remained latent for years, should begin to give subjective disturbances, and coincidentally with this epoch there should be found lowered amounts of antipepsin, the inference would be, that the organism had become exhausted in its manufacture of antipepsin.

**GASTRIC ULCER AND CARDIOSPASM.** Heyrovsky,<sup>3</sup> an assistant in the same surgical clinic with Exner (see Gastric Ulcer and Tabes), has come under the spell of the vagus theory, and he believes that there is a direct relationship between cardiospasm, gastric ulcer, and degeneration of the vagus. He thinks that the same condition which causes the last, accounts for the cardiospasm. A reflex contraction from the ulcer seems improbable according to Heyrovsky.

**GASTRIC ULCER AND GASTRITIS.** By referring to my monograph of last year (page 59) a review of an interesting work by Heyrovsky on the association of gastritis and gastric ulcer will be found. The paper of Chessin<sup>4</sup> is along the same lines as Heyrovsky, in fact, both Chessin's and Heyrovsky's researches have their inspiration in a paper of Crämer.<sup>5</sup> Chessin removed a small portion of the gastric mucous membrane from patients operated on for gastric ulcer, following the same method as that used by Crämer. He found that there was always a change in the mucosa taken from the ulcerated area, and even the glandular epithelium of other parts of the stomach was infiltrated. This infiltration can be followed through increasing degrees, until microscopic ulcerations are seen. As significant as this finding may appear, Chessin very wisely refrains from drawing any inference as to its relationship to gastric ulcer.

**GASTRIC ULCER AND CARCINOMA.** The grafting of cancer on gastric ulcer was first called attention to by Cruveilhier in 1839, and this

<sup>1</sup> Kathe, Berl. klin. Woch., 1908, p. 2136.

<sup>2</sup> Mitt. a. d. Grenzgeb., 1912, vol. xxv, p. 391.

<sup>3</sup> Wien. klin. Woch., 1912, p. 1406.

<sup>4</sup> Arch. f. Verdauungskr., 1912, vol. xviii, p. 523.

<sup>5</sup> Ibid., 1911, vol. xvii, p. 11.

teaching gained credence until the acme of faith was shown by Zenker, in 1882, who put forward the hypothesis that all cases of gastric cancer have their origin in ulcer. Mayo and his staff place the figures at 62 per cent. Paterson,<sup>1</sup> however, questions the frequency of ulcer as a precursor of carcinoma. He says the following argument is unscientific and fallacious: "Cancer is a disease, the duration of which is comparatively short. A long history of gastric trouble is evidence of the presence of an ulcer, therefore when cancer is associated with a long history, the cancer must have been grafted on a simple ulcer."

He does not believe that a gastric ulcer can be diagnosed from the history alone, and operation shows that gastric ulcer is far less common than originally supposed. The symptoms are frequently due to disease of the appendix or of the gall-bladder, to septic gastritis, or to intestinal toxemia. The second fallacy which Paterson sees in the above argument is the assumption that the duration of carcinoma is never protracted, but "until we know more of the natural history of gastric cancer we are not justified in drawing conclusions as to whether it is, or is not, greatly prolonged in some instances."

Paterson argues that if simple ulcer is a frequent phenomenon of cancer, then cancer of the duodenum should be at least as frequent as gastric cancer, which it is not, and again, many of the patients on whom gastro-enterostomy has been performed should die of cancer, but Paterson's mortality is but 1 per cent., and Kocher has had 50 cases without a suggestion of malignancy. In view of such observations, Paterson finds it difficult to accept the view that grafting of cancer on simple ulcer is a frequent event.

In a study of 1000 cases of cancer, Friedenwald<sup>2</sup> found that only 23 per cent. presented any history of previous digestive disturbances, and but 7.3 per cent. had a definite history of ulcer. He disagrees with the percentage of 71, which Wilson and MacCarty report from the Mayo clinic, believing this to be far too high. He thinks that perhaps even the 23 per cent. as in his own series, is too high.

**GASTRIC ULCER AND TABES DORSALIS.** Exner and Schwarzmann,<sup>3</sup> in the course of their operations for the relief of tabetic crisis (vagotomy), have encountered 6 cases with evidence of ulceration. This frequency of association led them to search the archives of the pathological institute in Vienna, where sections in 75 cases of tabes have been reported: ulcer, 5 cases (or 6.6 per cent.); cancer, 3 cases (or 4 per cent.); ulcer and cancer, 8 cases (or 10.7 per cent.). The authors examined the clinical history and found that the five cases of ulcer and the three carcinoma patients all had typical gastric crises. They admit that they were astounded at the frequency with which tabes and ulcer occurred.

<sup>1</sup> *Lancet*, 1912, vol. ii, p. 1710.

<sup>2</sup> *Boston Medical and Surgical Journal*, 1913, vol. clxviii, p. 796.

<sup>3</sup> *Wien. klin. Woch.*, 1912, p. 1405.

The explanation offered is, that in tabes the vagi are diseased, and since it has been shown that ulcer of the stomach may be produced in rabbits by vagotomy, the inference seems to them obvious. They now recommend that vagotomy and gastro-enterostomy be performed at the same time for gastric crises of tabes. The authors state that five other cases operated upon showed no evidence of gastric disease.

The role which Exner and Schwarzm̄ann ascribe to the vagus nerve seems obvious, but equally obvious seems another feature of the subject which has apparently escaped the writers' consideration. It is this: If section of the vagi can cause gastric ulceration, and if the coincident ulceration in tabes dorsalis is due to degeneration of the vagus, is there not danger in producing ulceration by vagotomy in those cases (5 cases) which showed no evidence of gastric disease? I think this query is most pertinent, and a satisfactory reply is at present not at hand. Only by observing a number of cases through a long period of time, will one be in a position to state that an ulcer is not produced. Autopsy control of such cases of vagotomy will definitely decide the question. One might reply to my objection that anything is preferable to the lancinating pains of a tabetic crisis, but a sufferer with gastric ulcer is equally certain that nothing can be worse than a life of semi-invalidism such as he faces. At all events, the neurologist might welcome assurance that his patient will not later develop an "experimental" gastric ulcer at the expense of freedom from tabetic crises.

Cheney<sup>1</sup> makes a contribution to the occurrence of gastric disturbances in tabes dorsalis, but his summary does not seem to be conclusive. He states that "they" (gastric disturbances) "are not accompanied by the evidences of organic disease in the stomach that one expects to find, they recur in spite of treatment of all kinds directed to the stomach even in spite of laparotomy; they usually appear abruptly, without reason, and cease suddenly regardless of treatment, leaving the patient perfectly free from gastric disturbance in the intervals." Cheney's first case had all the symptoms of gastric ulcer, pain and bloody vomiting, and one wishes that a gastro-jejunostomy had been performed instead of an exploratory laparotomy. The author admits that salvarsan, bichloride of mercury and iodide of potassium did not bring relief, and the case has all the ear-marks of gastric ulcer. It is unfortunate that no x-ray pictures were taken, nor is there any mention of the tests ordinarily used to determine the degree of retention. This is a most important feature as it occurs in 65.3 per cent. of gastric ulcer cases.<sup>2</sup> I am inclined to regard some of Cheney's cases as cases of ulcer. Inasmuch as Exner and Schwarzm̄ann found gastric ulcer in six of eleven cases of tabes, the coincidence must not be lost sight of and the probability of the association should not be dismissed too hastily.

<sup>1</sup> American Journal of the Medical Sciences, 1913, vol. cxlv, p. 328.

<sup>2</sup> Smithies, American Journal of the Medical Sciences, 1913, vol. cxlv, p. 340.

**TREATMENT OF GASTRIC ULCER.** The question when an ulcer is to be treated surgically and when medically has been answered,<sup>1</sup> to the effect that simple uncomplicated ulcers belong to the internist. The foundation of any treatment consists of rest in bed, hot compresses, and liquid diet, following the original von Leube plan. Schütz believes rest in bed is by far the most important of the three, but hot flax-seed poultices are a great help in combating the pain. Milk is given with cream every hour in portions of 0.1 liter, and this restricted diet is continued for two weeks. An exception is made when pain disappears and appetite returns, in these cases a few days of milk diet suffices, and one can proceed to semi-liquid nourishment. He is not in favor of the rapid increase of food given in the Lenhardt diet, which in many hands has not proved to be the wise course of procedure. Schütz makes the statement, which will meet with the approval of all, that one should not treat all cases of ulcer according to a fixed printed diet, but that any scheme or plan should be made adaptable to the individual case.

As far as drugs go, he warns against the use of silver nitrate and iron chloride. Bismuth, 10 to 20 grams, in a half glass of water, he says he gives before the meal. It seems scarcely possible that he gives such doses every hour (milk is given that frequently) although nothing is said to the contrary. For the hyperacidity which is commonly associated, he recommends a small coffeespoonful of the following prescription after meals:

Only when the above medical procedures fail to give relief, does Schütz advise surgical interference.

*Effect of Scarlet Red on Gastric Ulcer.* While using scarlet red in the treatment of ulcer of the skin and mucous membrane, Davis and Deming<sup>2</sup> were led to experiment with its internal administration in gastric ulcer. The dye was found to be non-toxic to dogs and rabbits. Given by mouth it stains the body fat red, but the stain is gradually eliminated. When administered subcutaneously and intraperitoneally, only the fat is in actual contact with the scarlet red solution. The authors question whether the dye has a definite stimulating action on the epithelium about defects of the mucosa, but the epithelium nevertheless seemed to develop more rapidly and better than in the control animals. Their results are suggestive, and they feel that it is perfectly safe, and, indeed, desirable, to give scarlet red a thorough trial in cases of gastric ulcer. They recommend that capsules containing three decigrams be given every three or four hours.

<sup>1</sup> Schütz, Wien. klin. Woch., 1912, p. 1513.

<sup>2</sup> Johns Hopkins Hospital Bulletin, 1912, p. 332.

*Perforated Gastric Ulcer.* The excuse of Lecene<sup>1</sup> in reporting five cured cases of perforated gastric ulcer is to insist that such cases can be cured if the diagnosis is made early. This early diagnosis is made more certain if one will bear in mind that contraction and rigidity of the abdominal wall is a constant and never failing sign.

Schnitzler<sup>2</sup> has operated on three cases of ulcer several days after perforation and the fourth case four days after perforation. In all four cases, the ulcer was completely walled off, and the condition was apparently spontaneously "cured" as far as the question of life or death was concerned.

*Result of Medical Treatment.* The internist has often, what seems to be, too keen an interest in the results of his colleague the surgeon, as far as the after-effects of the latter's treatment is concerned. So keen, and, one might say, so closely focussed is his attention, that the beam in his own eye is overlooked. As far as I am aware, there are comparatively few statistics which illustrate of what permanent good or evil medical treatment has been productive, and we welcome a short article by Parilä.<sup>3</sup> This author has searched and studied the records of a hospital in Helsingfors bringing forth the fact that from 1890 to 1909 there were 319 cases with the diagnosis of *ulcus ventriculi*, of which only 281 were definitely proved to be true ulcer cases. Of these, 281 cases, 28, or 10 per cent., died in the hospital, and 39, or 13.8 per cent., were regarded as unsuitable for medical treatment. These were referred to the surgeon and 31 cases were operated upon. The remaining 214, or 76.2 per cent., were discharged cured or improved, and of these, 120 patients were followed up and the subsequent state of health determined.

At the time these 120 patients were discharged from the hospital, 104, or 86.7 per cent., were completely cured or very much improved, and 16, or 13.3 per cent., were unimproved. The following two tables are most interesting. In the group "Well" are those individuals who have complained of no gastric trouble and who are able to work. In the group "Improved" are those who complain occasionally of gastric distress so that their work, at times, is materially interfered with, or else their trouble is of such a nature that only by strict dieting are they ever free from pain. In this group also, are those, who since their discharge from the hospital have been forced to seek other less strenuous employment, and who cannot do much physical work without return of symptoms. In short, in this group are individuals who are able to work but whose capacity for work is diminished.

In the group of "Unimproved" are those cases who are really unable to work.

<sup>1</sup> Presse Méd., 1912, p. 865.

<sup>2</sup> Med. Klin., 1912, p. 938.

<sup>3</sup> Arch. f. Verdauungskr., 1912, vol. xviii, p. 294.

TABLE I.—Condition of Patient at End of 1910.

Years of treatment.	Well.		Improved.		Unimproved.		Died.		Total.
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	
1890 to 1894	1	12.5	2	25.0	..	..	5	62.5	8
1895 to 1899	11	25.0	11	25.0	1	2.3	21	47.7	44
1900 to 1904	10	34.5	12	41.4	..	..	7	24.1	29
1905 to 1909	13	33.3	18	46.2	5	12.8	3	7.7	39
1890 to 1909	35	29.2	43	35.8	6	5.0	36	30.0	120

Of the 120 patients in Table I about whom later information could be had, 29.2 per cent. were completely well and unable to work, 35.8 per cent. were improved, and 5 per cent. were no better; 30 per cent. had died of gastric ulcer.

TABLE II.—Condition of Patient at End of 1910. Cases are Grouped According to Age and Sex.

MALES.									
Age.	Well.		Improved.		Unimproved.		Died.		Total.
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	
15 to 20	2	50.0	2	50.0	..	..	..	..	4
21 to 30	4	16.0	13	52.0	4	16.0	4	16.0	25
31 to 40	6	23.1	8	30.8	1	3.8	11	42.0	26
41 to 50	4	28.6	1	7.1	..	..	9	64.0	14
51 to 60	2	18.2	2	18.2	..	..	7	63.6	11
61 to 70	..	..	1	50.0	..	..	1	50.0	2
15 to 70	18	22.0	27	32.9	5	6.1	32	39.0	82

FEMALES.									
Age.	Well.		Improved.		Unimproved.		Died.		Total.
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	
15 to 20	5	62.5	3	37.5	..	..	..	..	8
21 to 30	8	72.7	2	18.2	1	9.1	..	..	11
31 to 40	3	37.5	4	50.0	1	12.5	..	..	8
40 to 50	..	..	3	42.0	..	..	4	57.0	7
50 to 60	1	25.0	2	50.0	1	25.0	..	..	4
61 to 70	..	..	..	..	..	..	..	..	..
15 to 70	17	44.7	14	36.8	3	7.9	4	10.6	38

In Table II are figures which show that there is a greater tendency to healing in young individuals. Almost twice as many women were cured as men (44.7 per cent. as against 22 per cent.). As far as mortality is concerned, 39 per cent. of males died and only 10.6 per cent. of females. Both of these facts are probably explained by the harder work done by the man.

Information concerning the cause of death was generally furnished by the relatives of the deceased and on this account the data is not reliable. Almost all of the deaths were seen in those who left the hospital "unimproved" or "improved." Only one of the "well" cases died, and this was six years later of hemorrhage from the stomach.

The majority of the deaths occurred in the first two years after leaving the hospital.

The treatment in the hospital lasted 34.8 days, and both the Leube and the Lenhartz methods were used. Parilä believes that in those cases with hematemesis, about 80 per cent. are cured or improved, but that scarcely 40 per cent. of those remain completely well so that they are able to work.

Inasmuch as those having hard work to do stand a poorer chance of good health than do those with easier occupations, it might seem advisable to refer ulcer patients to the social service department for help in securing positions more suitable to their health than their former work.

The reader will find a comparative study of the foregoing with what follows a matter of no little interest, some pleasure, and much profit.

*Result of Surgical Treatment.* The after-history of the patients operated upon for gastric ulcer is not a closed and finished book by any means. The impression is growing among internists that patients are temporarily benefited by surgical interference, but that ultimately there is a return of their old trouble and they are scarcely better off than they were before operation. We are interested, therefore, when surgeons write dispassionately of their postoperative results.

Bourne<sup>1</sup> has a study of 67 cases, the interval between operation and record of their after-history ranging from eighteen months to five years. He bases his results on subjective symptoms alone, grading them according to the freedom from those symptoms which led him to have an operation. When a patient reports himself entirely free from pain, nausea, and hematemesis on ordinary diet, with a gain of weight, he is given, an E (excellent). If the patient is but little better, *i. e.*, the pain and vomiting have not improved, or if the improvement is only very slight he is given a B (bad), and other grades are G (good) and F (fair).

As far as the mortality of the operation is concerned, there were seven deaths out of 92 cases (7.6 per cent.), but Bourne says that in later years the mortality has been much less, due to improved technique. This part concerns us little.

The general results of the author's 67 cases are learned from this table:

Result.	No. of cases.	Per cent.
Excellent . . . . .	29	43.2
Bad . . . . .	26	38.8
Good . . . . .	6	8.9
Fair . . . . .	6	8.9

Adding E and G together, and B and F, 52 per cent. were cured and 48 per cent. unimproved. This is not a striking record of success, and affords ample proof of the inapplicability of gastro-enterostomy to all

<sup>1</sup> British Medical Journal, 1913, vol. i, p. 438.

kinds of gastric ulcer. Bourne believes that since 43 per cent. of the operations were successful, and 38 per cent. were hopelessly the opposite, that there must be a very real difference in the etiology of the disease, a remark which is strangely reminiscent of Bolton's teachings (*q.v.*).

The effect of age on the prognosis is given in this table:

Age.	No. of cases.	Excellent.	Bad.	100 per cent.
Below twenty years . . .	1	..	100	per cent.
Twenty to thirty years . . .	13	23 per cent.	77	"
Thirty to forty years . . .	14	28 "	72	"
Forty to fifty years . . .	20	65 "	35	"
Fifty to sixty years . . .	14	72 "	28	"

According to this, then, the prognosis is much better when the patient is over 40.

As possible causes for the failure to achieve more brilliant results, Bourne suggests.

1. Recurrence of the ulcer or its failure to heal.

(a) Closure of the anastomosis.

(b) Persistence of those conditions which either gave rise to the ulcer or prevented it from healing.

2. Formation of jejunal or gastrojejunul ulcer.

3. Apparent relapses, but which are more properly classified as symptoms due to adhesions.

Let us turn our attention to another paper by a surgeon, Sherren<sup>1</sup> which opens breezily: "It is now well recognized that the death-rate after gastrojejunostomy for the treatment of chronic ulcer of the stomach and duodenum is low and the immediate result good," and then this less jocund statement, which seems as if whispered, "the after-history of these patients is, however, not so well known." He publishes a table of 72 cases operated on at least two years previously. Failure to classify his results and to tabulate them, as Bourne did, for instance, makes his successes and failures difficult of percentage reckoning. The opening sentence is supported by the closing lines, "Operation in unselected cases of gastric and duodenal ulcer can be carried out with a death-rate of less than 3 per cent., and carries with it relief in certainly 96 per cent. of the cases, and the probability of cure is over 80 per cent."

Berg,<sup>2</sup> another surgeon, claims that simple gastro-enterostomy can influence pyloric or duodenal ulcer only when there is an attendant pylorospasm. When this is absent, food passes through the pylorus as before, and the irritation and traumatism of the ulcerated area continues as before. Gastro-enterostomy will not protect against a recurrence of the ulcer, nor will excision promise any more. Excision of the

<sup>1</sup> Lancet, 1912, vol. ii, p. 76.

<sup>2</sup> Journal of the American Medical Association, 1913, vol. lx, p. 881.

pylorus does, however, insure against recurrence, but it has a higher mortality (12 to 14 per cent).

**Hour-glass Stomach.** Cerné and Delaforge<sup>1</sup> define this condition as a congenital acquired deformity of the stomach in which that organ is constricted by a retraction dividing it into two pockets: one above, the other so situated that functional disturbances result.

The congenital form is rare, and has even been disputed, even the classical case of Sandifort failing to support the congenital theory as it was at first thought it might do. (See PROGRESSIVE MEDICINE, December, 1912, p. 63.) It is fair to suppose that all cases of hour-glass stomachs are acquired, and that the deformity is permanent, caused by disease of the wall of the stomach. Tuffier and Roux-Beiger<sup>2</sup> prefer to regard other so-called hour-glass contractions, biloculations caused by compression or by spasm as "false biloculation." Ulcer is the most frequent cause, although tuberculosis and syphilis, or even cancer, may be etiological factors. I reviewed last year the subject of hour-glass stomach in great detail with an outline of the clinical methods used to diagnose this condition, so further discussion may be dispensed with here.

Cerné and Delaforge agree with the above-named authors that only the deformity caused by cicatrization of an ulcer should be called hour-glass stomach.

Von Delm<sup>3</sup> discusses the intermittent form of hour-glass stomach in a paper difficult to read, on account of there being no paragraphing throughout the whole extent of the paper. The main point he brings out is, that the intermittent form as its name implies is not permanent and can be seen to disappear under observation.

**Carcinoma of the Stomach.** The number of tests devised for the early diagnosis of carcinoma of the stomach is sufficient proof that as yet there is no satisfactory sign, symptom, or test whereby we can state with any degree of exactitude that there is a beginning cancer present. A test is reported, has a brief fastigium of torrid public discussion, and then reaches oblivion by lysis, never more to be dragged into the light. Like the conquerors of old, cancer rides on nevertheless, ruthlessly laying low its victims, with the tests which were to report its coming, strewing its lethal path. Nothing seems to me to be any nearer the goal than this: when an individual past forty five years, who has previously been healthy as far as the stomach is concerned, presents himself complaining of gastric trouble of acute onset and persistent duration, suspect cancer. To suspect cancer is one thing, to prove it another, and this proof, a proof possessing a positiveness which permits of no debating as to the advisability of early operation, a test, or a sign, or a

<sup>1</sup> Arch. des Mal. de l'App. Dig., 1912, vol. vi, p. 332.

<sup>2</sup> Presse Méd., 1913, p. 369.

<sup>3</sup> St. Petersburg. med. Zeitsch., 1912, p. 237.

symptom, or any sure means of recognizing the first implantation of a carcinoma in the organism, is unfortunately wanting. Too long have we delayed when we wait for the secondary manifestations of a tumor—retention, loss of weight, cachexia, tumor formation—and to be productive of any permanent good from treatment, our diagnosis must be made in the incubation of the cancer, so to speak, and not when it is an unbridled parasite enjoying its fullest activities at the expense of its host. Much has been hoped for from a study of the chemistry of cancerous individuals, but, unfortunately, in the majority of these studies, one test alone has been signaled out, and without comparing it with any other, its usefulness has been lauded or condemned. It is, of course, an impossibility to attempt a comparative study of all the so-called cancer "tests" but a step forward has been made by Feurer<sup>1</sup> in comparing three of the newer tests, the colloid nitrogen of the urine (Salkowski), the presence of hemolysin in the gastric contents (Grafe-Röhmer), and the presence of a polypeptid splitting ferment (Neubauer and Fischer).

As far as the Salkowski test is concerned, it seems to be a "cachexia reaction" and not a specific test for carcinoma; the hemolysis test is by no means satisfactory, and the polypeptid (glycyltryptophan) test is practically valueless. Fuerer insists that none of these tests furnishes results that harmonize with the other two, and that the most careful investigation of the symptomatology together with an exact physical examination can alone give the correct clue. Laboratory tests are but an aid.

**GLYCYLTRYPTOPHAN AND TRYPTOPHAN TESTS.** Last year, after having reviewed<sup>2</sup> most carefully the literature on these tests, I was forced to the admission that one was still *in media res* so far as opinions were concerned. One paper would be enthusiastic, and the next paper, with much brandishing of the instrument which the poet tells us is mightier than the weapon of war, would assault the former's newly erected citadel, and strike its colors. Smithies<sup>3</sup> has used a uniform method in 1175 different individuals, arriving at the following conclusions: More than one-third of the proved cases of cancer of the stomach gave positive glycyltryptophan reactions; more than one-fourth were lactic acid positive and about one-thirteenth of the number exhibited the tryptophan test. The diagnosis in each case, however, was quite positive without having recourse to these tests. Gastric conditions other than cancer give positive tests, but of all cancer most frequently. The test is, therefore, not pathognomonic of gastric carcinoma.

Under the naïve title, "One More Test for Cancer of the Stomach," Medina<sup>4</sup> suggests using glycyltyrosin, which contains about 45 per

<sup>1</sup> Mitt. a. d. Grenzgeb., 1912, vol. xxiv, p. 870.

<sup>2</sup> PROGRESSIVE MEDICINE, December, 1912, p. 71.

<sup>3</sup> Archives of Internal Medicine, 1912, vol. x, p. 357.

<sup>4</sup> Arch. d. Mal. de l'App. Dig., 1912, vol. vi, p. 306.

cent. of tyrosin. In cancer this body is broken up, tyrosin is liberated, and can be easily recognized, by centrifugalization, from the typical crystalline form.

ANTITRYPSIN. When blood is allowed to remain on a Löffler blood serum plate, the serum is readily digested, due, it is thought by Jochmann and Müller, to a ferment inherent in the polynuclear neutrophiles. That this is true and that the lymphocytes do not contain this digestive ferment was later proved by Müller in his work on pneumococcal sputum. This digestion, it was soon found, could be brought to a standstill by adding normal serum to the leukocytic suspension, thereby proving the existence of an antiferment in normal blood serum.

Brieger and Trebing have demonstrated that, in carcinoma and in all diseases associated with destruction of leukocytes, the antitrypsin contents of the blood are increased. Brieger has termed this phenomenon "cachexia reaction," since he has observed it in many diseases which are associated with the cachectic state. Waelli,<sup>1</sup> whose article I abstract, says he has examined 120 patients, many of whom were cachectic. Of these, some were positive, some were not. A case of coxitis was very strong; a case of carcinoma mammae, on the other hand, was negative.

Some light has been thrown on the nature of this reaction by animal experimentation. Fürst discovered that when guinea-pigs were starved, the antitryptic index rose, with loss of body weight. After injection of phosphor or phloridzin, which produced destruction of protein tissue, Braunstein found a great increase of antitrypsin, and this rather coincides with Fürst's view, as in his analyses there was an unusual destruction of protein tissue.

On the opposite side are arranged Bergmann, Ruge, Jochmann, and Meier, who showed that starving dogs never had a high antitryptic index. In marasmus, Klug found a decrease of the antitryptic index. It was believed that the antiferment was in some way associated with destruction of leukocytes, but Waelli thinks there is some intermediary metabolism, which leads to its formation. He believes this metabolite is in the nature of an antiferment called into existence by a ferment which arises in the organs or in an organ. There may be two sources of the proteolytic ferment: (1) Leukocytes; (2) parenchyma of pancreas and thyroid and perhaps neoplasms, but no matter where or how formed, antitrypsin is always produced (antitryptase).

The most obvious question is whether there is an increase of the antitryptase in carcinoma, and whether other conditions are associated with an increase. Without going into the details of Waelli's work, the reproduction of two tables will give a striking view of the value of the antitryptic index in 120 cases.

<sup>1</sup> Mitt. a. d. Grenzgeb. d. Med. u. Chir., 1912, vol. xxv, p. 184.

	Carcinoma	Tuberculosis.	Struma.	Graves' disease.	Active infections.	Miscellaneous.
Total . . .	47	19	21	12	8	13
Positive . . .	44	17	15	12	6	4

93.6%      89.5%      76.1%      100%

The only ray of hope which Waelli sees in the reaction is its usefulness in differentiating a benign from a malignant tumor. Inasmuch as the reaction is positive in such a high percentage of cases, a benign tumor would probably show a negative reaction, though he offers no proof to this effect. The reader is referred to Waelli's article where he will find a concise array of opinions which in no way serves to make me convinced that the reaction has even the small value ascribed to it by our author.

Roux and Savignac,<sup>1</sup> having studied 125 cases, believe that a normal antitryptic index excludes cancer, which accords somewhat with Waelli's view. The two authors are, however, much too enthusiastic, it seems to me, as they attach a "grande importance" to the semeiologic significance of the reaction, although they confess it is not a specific test.

SULPHUR REACTION IN THE URINE IN CANCER. This test, devised by Salomon and Saxl, consists in oxidizing the sulphur in the oxyprotein molecule, and isolating it as such. The authors<sup>2</sup> claim 61 positive reactions in 81 carcinoma cases, and subsequent observers, namely, Kaldeck<sup>3</sup> and Pribram<sup>4</sup> have had equally good success. Petersen<sup>5</sup> has submitted the reaction to a thorough test, and regards it as a useful diagnostic aid in carcinoma of the gastro-intestinal tract, although he denies it any specificity. Great care should be exercised in interpreting reactions obtained in liver diseases and in icterus. Salomon and Saxl emphasize this point also.

Mazzitelli<sup>6</sup> has studied the test in 50 cases of cancer, with or without cachexia. In 18 cases of the latter variety, the reaction was positive in fourteen, and in all but two of ten patients with tuberculosis. The reaction was positive in 16 of 26 patients with cachexia of various origin, including 11 with cancer and 4 with tuberculosis. In the tuberculous individuals giving a positive reaction were 2 patients with apical processes but no fever, 1 with a febrile process in the knee, and 3 with moderate apical findings; 1 patient with the juvenile form of diabetes, responded, and 1 with influenzal bronchitis.

The technique briefly is as follows: 150 c.c. urine, freed of albumin by heat and acid, are diluted with 100 c.c. water. A mixture of 100 c.c. of a saturated aqueous barium hydrate solution and 50 c.c. of a saturated

<sup>1</sup> Arch. d. Mal. de l'App. Dig., 1912, vol. vi, p. 453.

<sup>2</sup> Wien. klin. Woch., 1911

<sup>3</sup> Wien. med. Woch., 1911.

<sup>4</sup> Ibid., 1911.

<sup>5</sup> Deutsch. med. Woch., 1912, p. 1536.

<sup>6</sup> Abstract, Journal of the American Medical Association, vol. lix, p. 978.

aqueous solution of barium chloride are added, filtered, and the filtrate tested with baryta water to see if precipitation is complete. In order to remove the ethereal sulphates, 300 c.c. of the filtrate are made acid with 30 c.c. hydrochloric acid, boiled for fifteen minutes in a 500 c.c. Erlenmeyer flask, using a funnel condenser. The flask is placed on a water bath for twenty-four hours, 200 c.c. of the clear filtrate are mixed with 3 c.c. of hydrogen peroxide (perhydrol—Merck), or with 30 c.c. Oxydol-Petri and boiled for fifteen minutes with a funnel condenser. After boiling, the liquid is allowed to stand in a conical glass where, at the end of six hours, the amount of brown precipitate is estimated.

COLLOIDAL NITROGEN IN THE URINE IN CANCER (SALKOWSKI'S TEST). This test, which was suggested by Salkowski,<sup>1</sup> in 1910, has been studied anew by Séminow.<sup>2</sup> Salkowski, be it remembered, precipitated the colloidal nitrogen of the urine by means of lead subacetate, zinc sulphate or zinc chloride, and found that this portion contained more nitrogen in cancerous conditions than it did in health. This test is shown by Séminow to be in nowise specific for carcinoma, higher amounts than normal being found in acute appendicitis, acute endocarditis, anemia, diabetes mellitus, and in tuberculosis. It has a value, nevertheless, for the colloidal nitrogen is found always raised in cancer, so it would seem that normal values are an indication that no cancer is present.

SEROLOGIC DIAGNOSIS OF CARCINOMA (v. DUNGERN). V. Dungern<sup>3</sup> has described, in various publications, his complement fixation test for carcinoma. This test, about which its discoverer is naturally most enthusiastic, is now undergoing its baptism of fire, and it is yet too early to predict the outcome. Rosenburg and Wolfsohn recognize some value in the method but disclaim any specificity as do Schenck<sup>4</sup> and Edzard.<sup>5</sup>

V. Dungern found in serum of malignant cases, deviation of the complement of fresh active serum alone and in combination with a suitable extract, whereas inactive serum does not give inhibition of the hemolysis. The reaction is said to be positive with all malignant tumors, and not with other diseases, with the exception of syphilis.

Halpern,<sup>6</sup> working in v. Dungern's laboratory, has examined 300 sera from individuals of whom only the name was given, so that the implication that end results were influenced by the clinical diagnosis does not hold in this connection. Of the 300 cases, 177 had definite diagnoses, 79 were carcinoma, 42 other tumors, and 56 were not tumor

<sup>1</sup> Berl. klin. Woch., 1910, Nos. 38 and 50.

<sup>2</sup> Presse Méd., 1913, p. 265.

<sup>3</sup> Münch. med. Woch., 1912, Nos. 2, 20, 52.

<sup>4</sup> Wien. klin. Woch., 1913, p. 529.

<sup>5</sup> Berl. klin. Woch., 1912, p. 2488.

<sup>6</sup> Münch. med. Woch., 1913, p. 914.

patients. Of the 79 cancer cases, 71 gave positive reactions (89.8 per cent.). While the sera of the 56 non-tumor cases were negative in 52 cases (92.8 per cent.), Halpern admits that the reaction is not specific, but is a valuable addition to the diagnostic equipment.

A review of the biological measures used in the diagnosis of cancer of the stomach is by Enriquez and Weil.<sup>1</sup> The article covers the tests for specific substances in the blood and gastric juice. To sum up their conclusions: At the present time, in spite of the numerous, long, and delicate tests, in spite of the researches devoted to the blood and gastric juice in the search for specific bodies, it must nevertheless be admitted that there is no method which can assure one of the absence or presence of a malignant tumor. Deviation of the complement, study of precipitins, of anaphylactic shock, of toxicity of serum or gastric juice, none has fulfilled the promises expected of it. The study of lysins and antitrypsins should be continued—the results are not absolute but are useful. They quote Bezançon and Labbé as saying, "It is not in the laboratory that the diagnosis will be made, but in the presence of the patient by the clinician himself the serologic result must be judged of as is every other clinical sign."

Laboratory aid is regarded by those who have not served their apprenticeship in a laboratory, as a Delphic oracle. Sometimes the assistance received therefrom is startling in its exactness, but, alas, many times the results have been sadly misleading. It is not fair to the chemist or serologist to demand unerring opinions based on this or that test or reaction. No laboratory test, no matter how well conceived and how technically perfect it is, can be regarded as infallible, but each must be judged of as one regards a symptom. To suppose because a man who confesses to a syphilitic infection and has a positive Wassermann reaction, complains of acute swelling in the elbow-joint, etc., that that inflammatory process is a syphilitic lesion is apt to lead to grave error, as I<sup>2</sup> recently pointed out. He makes the best diagnosis who balances well the clinical and laboratory data, and who judges nicely of the merits or the demerits of that particular test, not as a test, but as it applies to this particular patient.

CARDIAC SIGN IN CANCER. Gordon<sup>3</sup> contributes a third paper on the "Cardiac Sign in Cancer," which he first described nine years ago in the *Transactions of the Royal Medical and Chirurgical Society*, March, 1904, and later in the *British Medical Journal*, 1908, vol. ii, p. 298. "The cardiac sign in cancer consists of a remarkable diminution of the cardiac dulness in the recumbent posture as determined by digital percussion. In that posture, the dulness in the normal adult begins above about the third costal cartilage, reaches rightward as nearly as possible to the

<sup>1</sup> Arch. des Mal. de l'App. Dig., 1912, vol. vi, p. 563.

<sup>2</sup> New York Medical Journal, 1913, vol. xeviii, p. 271.

<sup>3</sup> British Medical Journal, 1913, vol. i, p. 1152.

midsternal line, and measures across about 3 to  $3\frac{1}{2}$  inches at the level of the fifth costal cartilage. On the other hand, in the cancer patient who presents this sign, the cardiac dulness in recumbency begins above about the fourth or fifth costal cartilage, has its right margin  $\frac{1}{2}$  inch or 1 inch to the left of the midsternal line and measures across less than 2 inches at the level of the fifth costal cartilage. Often it measures less than 1 inch across. Sometimes there is no cardiac dulness at all."

The sign may be explained in three different ways: 1. The small size of the heart which is sometimes seen in cancer. Gordon believes this may partly explain it but not in every case, as the heart area often becomes abnormally broad in the erect posture, even though a small area of dulness was found in recumbency.

2. Gordon suggests that there is a loss of elasticity of lung tissue, similar to the loss of elasticity so common in the skin of a carcinomatous subject, and that ordinary respiration causes a form of emphysema, thus decreasing the dulness.

3. With the "cardiac sign" the heart sounds are very feeble, and there is a soft and toneless pulse, which indicate an anemic and flabby heart muscle. The flabby and imperfectly filled heart is supposed by Gordon to drop back from the anterior chest wall on recumbency more than a normal heart would do.

The author recognizes the limitations of this sign, and calls attention to four conditions which vitiate its usefulness. These are:

1. Emphysema, reducing the heart's dulness.
2. Conditions causing enlargement of cardiac dulness, albuminuria, valvular heart disease, retraction of lung from any cause.
3. Abdominal distention pushing the heart up.
4. Esophageal carcinoma.

When one allows for the limitations of this sign, it still seems to possess real value as the summary of Gordon's cases shows. Thus in 1908, when 103 cases were studied, the cardiac sign was present in 89 per cent. Since then 107 additional cases have been examined, of which 83 per cent. showed the sign. Careful controls were made with cases of pronounced non-cancerous wasting and only 8 per cent. of these showed the sign. The latter seems to have a practical value and is worth remembering in obscure cases. Just how early it appears does not seem to be settled.

**GASTRIC PERISTALSIS IN GASTRIC CARCINOMA.** Perussia<sup>1</sup> emphasizes the modifications in the peristaltic movements of the stomach, in diagnosing carcinoma of that organ. There seems to be no constancy in the peristalsis seen in cancer and in the abstract, from which I am quoting, the various kinds of peristaltic movements are described.

**TREATMENT OF CANCER.** No attempt will be made under this heading to offer an exhaustive résumé on the advances in the treatment of

<sup>1</sup> Abstract, Journal of the American Medical Association, 1912, vol. lix, p. 684.

cancer during the past year. Should the attempt be made and successfully carried through, I fear the result would crowd all else from this monograph. As I have remarked under the diagnosis of cancer, the number of treatments suggested for cancer is convincing proof that no treatment is efficacious.

*Autohemotherapy* has been studied by Krokiewicz<sup>1</sup> with some degree of success. In all events, after the treatment there was a diminution of pain, and cessation of vomiting. Appetite returned, the patient slept well and seemed to be subjectively and objectively benefited. In those cases operated upon, autohemotherapy accelerated the convalescence. Without favoring the reader with the rationale of the method, Krokiewicz narrates that he wished to see the effect of injection of the patient's own blood. To this end, he withdraws about 6 c.c. of blood from the median vein and injects it subcutaneously in the thorax. The injections are repeated every eight to ten days, during which time all medication is stopped. Full protocols describe the course of the disease under such treatment.

An article which reads as entertainingly as a page from fiction, but whose homely truth is made patent by the preface of Czerny, is that of Zeller.<sup>2</sup> One is apt to regard "cures" for tuberculosis and "cures" for cancer as too specious to be taken seriously, but when a remedy is advocated, its usefulness supported and substantiated by scientific and painstaking work, one's prejudices must be laid aside, and the "cure" investigated with an impartial eye. In such a spirit must we regard Zeller's paper. Nowhere does he speak of a "Kur," but he does claim to have cured certain cases of cancer by the internal use of silicic acid (0.06 gram in powder form three times a day) and by the external application of an arsenic paste. Neither of these remedies is a new one, but each has apparently been forgotten. Czerny, in his commendatory introduction to Zeller's article, says the lion's share of the good results must fall to the arsenic paste, as silicic acid in his hands has not borne much good fruit. Zeller cleans the cancerous field with benzin, and then smears the arsenic-mercury paste on thickly, the paste covering the surrounding tissue as well. When the paste is dry, a collodion dressing is put on if the area is small, or a gauze dressing if large and ulcerated. This is kept on for eight to fourteen days, and the procedure repeated. Internal médication of 0.5 gram sodium silicate, was also prescribed.

The reader, if interested, should read the original article, with the author's quaint biographical touches and descriptions of the uncertain development and perfection of his method of treatment. The imposing record of having cured 44 of 57 cancer patients speaks of itself. In the majority of these cases the cancer was but superficial, but some cases of carcinoma of the ear, upper jaw, lip, breast, and vagina were seen

<sup>1</sup> Wien. klin. Woch., 1912, p. 1320.

<sup>2</sup> Münch. med. Woch., 1912, p. 1841.

and benefited. Inasmuch as some of the last-named cases had been operated on repeatedly by surgeons, but without effect, the good results are striking. The author had no opportunity to study carcinoma of the digestive tract, but suggests that the internal treatment in addition to operation may be productive of much good. A paper confirming Zeller's treatment is published by Staudenmayer.<sup>1</sup>

There are two papers on the treatment of inoperable carcinoma which should be read by the internist and the surgeon alike, the one is by Gould<sup>2</sup> and the other by Czerny.<sup>3</sup> Czerny gives a good review of the various therapeutic procedures which have been favorably written about. He takes up Coley's work and the later researches on antibodies and body juices which his writings stimulated, then the various "ray" and emanation treatments, ending with a discussion of the application of chemotherapy to carcinoma.

Gould's paper is much more practical, and has to do principally with the general treatment of inoperable cases. Many suggestions offered can well be remembered. Palliative operative measures are described, and also the non-operative procedures, such as gumma radiations produced by the *x*-ray tube or by radium.

Finsterer<sup>4</sup> makes the recommendation that inoperable gastric carcinomas be sewed into the skin incision and then be subjected to the *x*-ray. The results obtained scarcely are calculated to make one wax very enthusiastic over this *modus operandi*.

**Achylia Gastrica.** Faber<sup>5</sup> has analyzed 207 cases of achylia gastrica occurring in his clinic, with special reference to the anemia which is generally associated. He does not believe that the atrophy of the gastric mucosa is the direct cause of the anemia, *i. e.*, he cannot understand just how the atrophy favors resorption of hemolysis from the stomach. The atrophy is but a consequence of the previous chronic gastritis. He leans to the belief that there is some bacterial factor. It is a well-established fact that the acid gastric juice has a decided bactericidal property, and that *propter hoc*, the beginning of the duodenum is sterile. In cases of achylia, however, the duodenum has a rich bacterial flora, and Faber believes that the latter accounts for the putrid diarrhea, and perhaps the anemia through hemolysis.

An opposite view is offered by Gross.<sup>6</sup> Just how many patients were studied before his hypothesis was reached is not stated, but one is led to believe that the number was very great. He reprints a typical history with laboratory findings which prove the absence of pancreatic digestion or achylia pancreatica. Hydrochloric acid seemed to be without effect,

<sup>1</sup> Münch. med. Woch., 1912, p. 2397.

<sup>2</sup> Lancet, 1913, vol. i, p. 215.

<sup>3</sup> Münch. med. Woch., 1912, p. 2209.

<sup>4</sup> Berl. klin. Woch., 1913, p. 958.

<sup>5</sup> Münch. med. Woch., 1912, p. 2797.

<sup>6</sup> Ibid., 1913, p. 855.

but "azidolpepsin" and "pankreon" brought about almost immediate relief, and Gross believes in the pancreatic insufficiency rather than in the bacterial theory, as the cause of the diarrhea and other intestinal derangements.

A point which has been lost sight of by Gross, and one which I believe is pertinent, is that it is not unlikely that the pancreatic insufficiency, if present, is due to an ascending inflammation from the duodenum, this bacterial inflammation being predisposed by the flora which has just been shown by Faber to exist in the duodenum when there is deficiency of hydrochloric acid in the gastric juice.

**DIARRHEA IN ACHYLVIA GASTRICA.** Vanderhoof<sup>1</sup> points out that this condition may be symptomless as far as the stomach is concerned, the complaint being confined to the state of the bowels—diarrhea. Indeed the clinical features of diarrhea secondary to gastric anacidity are clear cut and definite, so that not infrequently the diagnosis can be suspected before the stomach analysis is made. The most striking feature of the diarrhea is its occurrence early in the morning and during the forenoon, as a rule there being no movements in the afternoon or during the night. The patient is awakened about five or six o'clock in the morning, a second stool generally occurs before breakfast and the mid-day meal. The occasional alteration of diarrhea with constipation the author believes is due to medicine, and is not a peculiarity of achylia.

The bowel movements are inoffensive and contain macroscopic rests of fruit and vegetables. In other cases, the stools are soft and yellow, and contain fatty acid crystals. There is generally no mucus or blood. There is a good deal of flatulence and uneasiness in the abdomen, but actual abdominal pain is not a feature. As a rule, there is absence of any gastric symptoms.

When the diarrhea begins there is usually a loss of weight and strength, and a secondary anemia of marked degree occasionally develops.

The stomach empties itself so rapidly that often no remains of the Ewald meal can be extracted at the end of an hour. If removed in forty-five minutes, the bread particles seem to have been acted upon by no digestive agent, and the total acidity is usually below ten.

The *treatment* of this condition consists in the administration of large amounts of hydrochloric acid. Vanderhoof recommends thirty drops of the official dilute hydrochloric acid in a full glass of water one-half hour after meals, to be repeated again in one-half hour, or a total of 180 drops a day. He has found acidol tablets of service. They consist of hydrochloride of betain, a substance derived from molasses in the manufacture of beet sugar, and when they are dissolved in water or in the stomach, acidol gradually liberates hydrochloric acid.

<sup>1</sup> American Journal of the Medical Sciences, 1912, vol. exliv, p. 170.

Strong meat broths, preceded by *nux vomica*, should begin the meal, and the food should be well salted in order that the chlorine supply of the body be ample for the production of hydrochloric acid. Buttermilk is advised also.

As far as administration of hydrochloric acid is concerned, I have had good results in such cases, giving hydrochloric acid with the meals through a glass tube. The object of this is to get small amounts of acid at a time, mixed thoroughly with the food as eaten. I also recommend increasing the dose of the acid three drops a day, beginning with fifteen drops three times a day, the next day sixteen, and so on, being guided as to the limit by the subjective state of the patient. I have never employed acidol, but Vanderhoop's recommendation is worth remembering.

**Gastrophtosis.** Schlessinger,<sup>1</sup> by a careful study of patients with the *x*-rays, has erected what he is pleased to call a theory, based on actual truths, of the etiology of gastrophtosis. The actual truths are reproduced in the article and assist the reader materially in following the author's train of thought. The first step in the process is said to be a stretching of the walls of the stomach, and since the cardia is but really part of the stomach, there is an attempt on the part of Nature to pull the cardia with the stomach, in order that the normal relations between the two will be observed. Hence cardioptosis is one of the first events. So far one follows Schlessinger in his arguments, but as the author stops for an instant in his flow of thought to explain to us his pictures, it occurs to us that we have not as yet been told what causes the stretching of the wall. It is true we are shown pictures of a stomach which contains 400 grams of a bismuth meal, and has therefore sagged, so we infer that food must play a role. With the dropping of the cardia comes dilatation and pulling downward of the esophagus, and finally a pull down of the diaphragm. We are told that the first step in gastrophtosis is a lengthening of the stomach, which causes a dropping of the cardia, and yet we are told that the dropping of the cardia is one of the three factors in the production of gastrophtosis. Is it not simpler to think that the stomach begins to sag and pulls the cardia with it, and that the cardioptosis is a result of the gastrophtosis, and not *vice versa*?

The esophagus is involved, it is true, to a great extent in gastrophtosis as is shown by Rovsing<sup>2</sup> who believes that one should make a special search for gastrophtosis in every case of dilatation of the esophagus. He thinks that the stomach can pull down the esophagus to such an extent that the latter becomes kinked. The obstruction to swallowing may be so marked that suspicion of esophageal carcinoma may be aroused as in Rovsing's case, a woman, aged forty-five years, who was brought to the brink of the grave from ptosis cachexia. Gastropexy

<sup>1</sup> Deutsch. Arch. f. klin. Med., 1912, vol. cvii, p. 552.

<sup>2</sup> Abstract, Journal of the American Medical Association, 1913, vol. lx, p. 564.

in his hands has been most efficacious in bringing about amelioration of symptoms.

There has always been some skepticism regarding the actual benefit which a patient receives from the customary *abdominal binders* in gasteroptosis. I do not mean doubt as to the subjective improvement, but uncertainty as to the real objective betterment. Von Noorden is particularly pessimistic about the advantage to be derived, except in cases of general visceroptosis, in which instances the stomach has been raised 3.5 cm. Borgbjärg and Fisher<sup>1</sup> reproduce some good pictures of cases "before and after" wearing the pneumatic pad of Enriquez.<sup>2</sup> The effect of the binder could not be better, in many cases the difference with and without the binder being very striking. Subjectively, there was marked improvement also, and the authors recommend warmly the air cushion, in preference to any other non-operative mechanical procedure.

**Atonia Ventriculi.** The cases of atony of the stomach are divided into two broad classes by Faber:<sup>3</sup> (1) the atonic insufficiency, and (2) the atonic dilatation.

1. ATONIC INSUFFICIENCY is divided into the (a) acute, and (b) chronic varieties, and these Faber takes up in detail.

(a) *Acute Atonic Insufficiency* is what we call acute dilatation of the stomach, and is always a serious and dangerous disease. The first description of the disease is to be found in Brinton's book, in which it is spoken of as a mysterious and fatal malady. The symptoms are sudden collapse, with vomiting and pain in the abdomen. The latter is very much distended, particularly in the epigastric region, and a succession splash may be readily elicited. Oliguria and thirst complete the clinical picture. In the majority of cases, death results in a few days, and at autopsy, the stomach is found to occupy the entire abdominal cavity, pushing the compressed intestine into the pelvis. The dilatation of the stomach is not all, as the organ is unable to empty itself, and as a result is filled with food, sometimes several days old. (Fränkel found in the water from lavage, food which had been eaten five days previously.)

Faber presents a careful résumé of the most important literature which has been written in the last fifty years, and I am abstracting his article very freely. The condition has already received twenty-one different names, and formerly it was believed that it was a kind of gastric ileus, the etiological moment being obstruction between duodenum and jejunum, the so-called arteromesentric duodenal obstruction. Payer has modified this view, holding that the primary condition is a paralysis, an atony of the stomach, and that the dilatation which follows as a matter of course, causes a shoving down of the small intestine, with a

<sup>1</sup> Arch. f. Verdauungskr., 1912, vol. xviii, p. 441.

<sup>2</sup> Presse Méd., January 11, 1908.

<sup>3</sup> Zeitschr. f. klin. Med., 1912, vol. lxxvi, p. 1.

resulting arteriomesenteric obstruction, which in time, aggravates still further the gastric condition. He insists, and this has been definitely shown, that the constriction by the mesenteric artery is not always a feature. Laffer showed that, in 120 autopsies, only 27 presented dilatation of the duodenum, which must result when the mesenteric artery exercises constriction on the duodenum at its point of termination with the jejunum. It seems correct, then, to assume that the primary condition is an acute atonic insufficiency.

Laache and Olaf Haussen have described four broad groups of cases in which this occurs.

1. The first group occurs when there is a rapid filling of the stomach, especially when it follows severe bodily exercise, as running.

2. The second group is seen after acute infections, pneumonia, and typhoid fever.

3. The third group is met with in patients with chronic wasting diseases, as pulmonary or joint tuberculosis, spondylitis, spinal cord disease, diabetes, and the like.

4. And the fourth group comprises the postoperative cases.

Laffer reports on 217 cases, 24 belonging in the first group (dilatatio extingestis), 56 followed other disease (6 after pneumonia, 5 after typhoid), 11 were seen in spinal deformities, 17 followed injury, and 97 (38.2 per cent.) occurred after operation. The number of the latter cases now reaches 200.

The discussion of these postoperative cases belongs in another department of PROGRESSIVE MEDICINE, but the reader is referred to Faber's article for their careful consideration. I refer the reader also to my article in PROGRESSIVE MEDICINE, December, 1912, page 77, for a discussion of the aérophagia theory of acute dilatation, which is illustrated by some illustrations from a paper by Mathieu.

(b) *Chronic Atonic Insufficiency.* While acute insufficiency is accompanied by pronounced symptoms, the chronic form is often overlooked, unless one's attention is particularly focussed in that direction. The symptoms are usually indefinite and the condition is only recognized by giving an evening test-meal and washing out the stomach in the morning. The meal which Faber prefers is known as the Bourget-Faber test-meal, and was fully described by me,<sup>1</sup> so repetition here may be dispensed with.

560 patients were studied with this meal, and 269 were found to be normal and 275 showed delayed emptying power; 36 showed twelve-hour retention; 34, eight-hour retention; 95, six-hour retention; 146, five-hour retention.

Therefore, in 49 per cent. of all gastric patients, delayed motility was present. The following diseases were diagnosed almost to a certainty, and the motility test showed the following:

<sup>1</sup> Zeitschr. f. klin. Med., 1012, vol. lxxvi, pp. 37 and 82.

Carcinoma ventricular of 29 patients, in 27.95 per cent.

Ulcus ventricular duodenum of 88 patients, in 69.80 per cent.

Gastritis (achylia) of 94 patients, in 48.52 per cent.

The following table will show the degree of retention observed in these cases:

	Five-hour retention.	Six-hour retention.	Eight-hour retention.	Twelve-hour retention.
Cancer . . . . .	0	4	3	20
Ulcer . . . . .	43	23	10	13
Gastritis . . . . .	22	13	10	3

Other cases diagnosed chronic dyspepsia and gastrophtosis were studied.

Dyspepsia . . . . 189 Delayed motility in 58 = 31 per cent.

Gastrophtosis . . . . 70 Delayed motility in 45 = 64 per cent.

259 Delayed motility in 103 = 40 per cent.

The degree of insufficiency may be learned from the following table:

	Five-hour retention.	Six-hour retention.	Eight-hour retention.	Twelve-hour retention.
Dyspepsia . . . . .	49	6	3	0
Gastrophtosis . . . . .	25	13	7	0

In the cases of ulcer, gastritis, dyspepsia, and gastrophtosis, Faber believes a pyloric obstruction can be absolutely ruled out, and he thinks it definitely shown by the above figures that the stomach is insufficient from muscular weakness, and that the retention does not come from pyloric stenosis or from dilatation.

As etiological factors in the production of this primary chronic atonic insufficiency, rapid eating and gourmandism occupy prominent positions. It has been shown by Jacquet and Debat (*x*-rays) that tachyphagia causes a greater dilatation of the stomach and a more delayed emptying than when the food is thoroughly chewed. Comparative studies were made between the effect on the stomach of a test-meal swallowed in twelve minutes, and one which required forty-five minutes to consume. Faber has studied the effect of rapid eating on idiots, and found delayed motility in about half of the cases, and he concludes that this factor is not an insignificant one in the production of chronic atonic insufficiency.

2. ATONIC DILATATION, which is discussed in the second part of Faber's paper, is, like the above, subdivided into the acute and chronic forms.

(a) *Acute atonic dilatation* in its most severe manifestations is frequently complicated by closure of the duodenum, so that the dilatation is in part due to stenosis, although the latter may be secondary to dilatation, the atony being the first step in the process. In the most

pronounced cases, the stomach is so greatly dilated that it occupies almost the entire abdominal cavity. The cardia and fornix ventriculi remain in the original position under the diaphragm, but the greater curvature reaches the symphysis, and rises to the pylorus. Frequently the lesser curvature is lengthened also. I am reproducing a cut from Hilton Fagge,<sup>1</sup> which Faber pictures in his article.

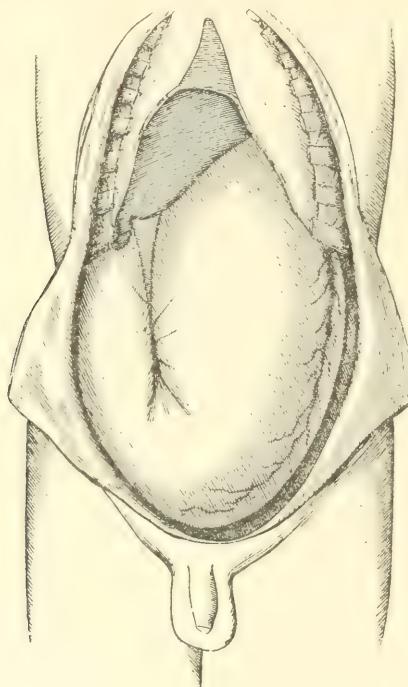


FIG. 5

(b) *Chronic Atonic Dilatation.* These cases have been regarded with some skepticism, and it is believed that the majority of them fall in the category of gastrophtosis. Faber holds, nevertheless, that there are undoubted cases, as he found in 85 patients with the diagnosis of gastrophtosis, 58 or 68.2 per cent. with delayed motility.

**Acute Dilatation of the Stomach.** Four cases are reported by Magaldi<sup>2</sup> and one case by Jensen.<sup>3</sup> All these were postoperative cases.

Last year (page 80) I reviewed at some length the article by Fussell on acute dilatation of the stomach complicating pneumonia, and since the above was written, I had the opportunity of seeing a similar case. That the condition is but little appreciated is evident from Fussell's

<sup>1</sup> Guy's Hospital Reports, 1873.

<sup>2</sup> Abstract, Journal of the American Medical Association, 1913, vol. lx, p. 408.

<sup>3</sup> *Ibid.*, p. 330.

failure to find mention of it in any text-book on medicine, and from the fact that up to 1911, only six cases had been reported in the literature. He reported five from his own practice, and this one of mine makes the sum total of cases in literature but twelve. The fact that Fussell encountered five cases, speaks for the rarity being due to deficient diagnostic acumen, rather than to the infrequency of the complication itself. My case was reported in the *New York Medical Journal*, 1913, page 271, and it is from this paper that I have drawn the present material.

Mrs. J. T., aged about sixty-three years. The patient was operated on by Dr. Hodge for chronic appendicitis, from which she had suffered for the last two years. At operation, the abdominal viscera were examined and were found to be normal. On the eighth day following operation, the patient had a chill and sudden rise of temperature to 104.6° and on the following day I saw the case in consultation with Dr. Hodge, and found a pneumococcic infection of the right lung. The patient combated the infection very well, the temperature reached normal on the eighth day of the disease. Three days later the patient complained of pain in the stomach, and vomited a small amount of black material. That night the patient vomited at irregular periods, the abdomen was very much more distended than on the previous day, and the pulse was also weaker and more irregular. Acute dilatation of the stomach was diagnosed, and lavage was immediately instituted. A large amount of dark, foul fluid was removed, which gave the reaction for occult blood. Lavage was continued until the fluid returned clear, many liters of water being required before this end was attained.

Full details of the course of the disease and outcome may be found in my paper, but it may be stated here, that the patient survived the acute dilatation only to succumb to acute renal insufficiency. The successful way in which this elderly woman withstood the onslaughts of three serious conditions, appendicitis, pneumonia, and acute dilatation of the stomach, was most remarkable.

**Pylorospasm.** Glassner and Kreuzfuchs<sup>1</sup> believe that the amount of hydrochloric acid in the gastric juice bears, of itself, no relation to spasm of the pylorus. If a normal man is given hydrochloric acid, there is no spasm, and in duodenal ulcer, there is even an exaggeration of peristalsis with increased motility of the stomach. The authors regard the relation between the acidity of the stomach and alkalinity of the duodenum as being the principal factor. When the HCl is greater than the alkalinity, there is pylorospasm, when HCl is equal to or is less than alkalinity, then the pylorus remains patulous. A study of the chemistry of the gastric juice and of the duodenal juices should prove most interesting and perhaps clinically profitable.

<sup>1</sup> Münch. med. Woch., 1913, p. 582.

**Dyspepsia.** The internist, and "some of our best men who confine their work to the medical treatment of diseases of the stomach," we are told by Wathen,<sup>1</sup> have not availed themselves of the wisdom of the surgeons, and are still calling conditions by such frightful names as "hyperchlorhydria," "acid dyspepsia," "acid gastritis," when, in reality, these are but symptoms of gall-stones, appendicitis, peritoneal adhesions, and other surgical conditions.

We, and by this I mean internists, are arraigned because we class a symptom as a disease, yet is not our esteemed colleague open to the same thrust? Are medical men content with the diagnosis "peritoneal adhesions," or do we not desire to know whence comes the irritation of the peritoneum whereby adhesions are called into being? Do medical men accept "gall-stones" as a disease of itself, or do we not seek to discover the composition of the stone, to trace its origin from this knowledge back to the underlying biliary stagnation or cholecystitis, and to find out the reason and cause for the last two?

We are further told that chemical analyses of the stomach secretions have been futile as a basis for pathology of gastric disorders, that the test-meal alone is of little value as an aid to diagnosis, and many other truisms which have long been recognized by the internist and which are now being emphasized by the author for the benefit of his surgical confrères, no doubt.

This paper will be read with interest by Wathen's medical colleagues, but they will hardly agree that "some of the best-known men in internal medicine, men who contribute much to medical literature, have seldom or never seen an abdominal operation on a living person." But we shall avoid further quotations, and shall permit the reader to choose from the original those passages which make a special appeal. The article, which must be read thoughtfully in order to appreciate it, conveys this message, that 30 per cent. of the gastric cases are really surgical, and these should not be treated by the internist, but should be referred to the surgeon for operation. Even neurasthenia is denied our loving care, and must be regarded as a fad, which, under the benignant glare of surgery, passes away like the snow when the warm rays of the sun shine on it.

**Sarcoma of the Stomach.** A case which recovered from resection of the stomach performed for sarcoma is reported by v. Graff.<sup>2</sup> The author calls the case cured, but as the patient was operated on May 13, 1912, and the paper published June 27, 1912, it is too early to speak of cure ("Heilung") or recovery unless one means "the operation was successful, but ——"

A pretentious monograph by Hesse<sup>3</sup> covering a bibliography of 233 references brings this subject up to date.

<sup>1</sup> Journal of the American Medical Association, 1913, vol. ix, p. 714.

<sup>2</sup> Wien. klin. Woch., 1912, p. 1005.

<sup>3</sup> Centralbl. f. d. Grenzgeb. d. Med. u. Chir., 1912, vol. xv, p. 550.

**Myoma of the Stomach.** Farr and Glenn<sup>1</sup> report a case with autopsy findings and take this opportunity of giving complete literary references. The symptoms appear to be indefinite, but operative interference seems to be warranted in the presence of severe and persistent hemorrhage with definite signs of pyloric obstruction. The authors advise wide resection on account of the tendency of these tumors to undergo malignant degeneration.

Ungar<sup>2</sup> has had a similar case under his care. The diagnosis was not made until operation, when it was seen that the myoma arose from an old gastric ulcer. Farr and Glenn have no satisfactory cause for the origin of myomas, but Ungar believes they always arise from an old inflammation (an ulcer) and in this sense they are like gastric carcinoma.

**Syphilis of the Stomach.** Meyer<sup>3</sup> devotes a lengthy article to this subject, and reports a case which he diagnosed on account of (1) pain occurring immediately after eating; (2) lack of hematemesis; (3) absence of occult blood in gastric contents and feces; (4) failure to receive benefit from an ulcer diet; (5) history signs of syphilis; (6) positive Wassermann reaction; (7) absence of tubercle bacilli in the sputum; (8) *x-ray* examination.

There was a palpable, irregular mass under the left rectus which, interpreted in the light of the *x-ray* findings, was probably a gummatous infiltration of the stomach. All symptoms, subjective and objective, disappeared under 15 drops of potassium iodide and inunctions of mercury.

He reviews the literature (50 or 60 cases) analyzing the etiology and pathology. The diagnosis, he says, is difficult, and largely a matter of personal acumen. Certain indices should warrant the diagnosis, the first of which is the establishment of a syphilitic infection by admission of the patient himself or by the Wassermann reaction. Secondly, the failure to cure or relieve by classical diet and drugs. Thirdly, a group of symptoms met singly or combined, consisting of pain, tenderness, emaciation, and hemorrhage. Pain occurred in 67 per cent. of the cases, coming on immediately after meals. Tenderness to pressure is very marked, more so than in early carcinoma, the result of extension from the submucosa to the serosa. Emaciation is a marked symptom, in 47 per cent. of the cases it being so prominent as to be almost the chief complaint. Hemorrhage is found in 30 per cent., and may be the first symptom. It may be so profuse that it has a fatal outcome, but blood in the stomach is not a symptom *per necessitas*, as Meyer's case had no blood in the stools or in the gastric contents. Vomiting is a symptom of the stenosis and not necessarily of the syphilis.

<sup>1</sup> New York Medical Journal, June 28, 1913.

<sup>2</sup> Deutsch. med. Woch., 1912, p. 2361.

<sup>3</sup> Albany Medical Journal, 1912, vol. xxxiii, p. 563.

Physical examination is of little value unless it reveals a syphilitic infiltration of the lungs which should be thought of when repeated sputum examinations fail to find tubercle bacilli.

**Arteriosclerosis of the Stomach.** Accepting Dal Lago's as a case of gastric arteriosclerosis, there are now sixteen on record. The *Journal of the American Medical Association*<sup>1</sup> has a comprehensive abstract of this article, and it is from these pages that I have derived my information, and the appended lines.

Arteriosclerosis of the stomach is usually part of a general visceral arteriosclerosis. Gastric symptoms are conspicuous, these comprising dyspeptic disturbances of various kinds, pain, and hemorrhage. The dyspepsia itself is of the flatulent, hyposthenic type, the discomfort coming on soon after meals, accompanied by drowsiness, painful distention of the stomach, dyspnea, nausea, and vomiting. The epigastrium is distended and tender, but belching relieves the symptoms, and these may subside until after the next meal. The appetite remains unimpaired and, as far as functional tests are concerned, nothing abnormal can be detected. In the form known as gastralgia, the pain may be sudden, with cramps and distention, lasting only for a few minutes, however. The pain may radiate to the back and scapula, with nausea, belching and regurgitation, all relieved by vomiting. These attacks may be accompanied by salivation and sweating, and anginal symptoms are seen, with an abnormally rapid, slow, or irregular pulse.

In the hemorrhagic form, hematemesis may be the first symptom noticed, this form is usually seen in younger individuals. Usually the bleeding comes from an eroded vessel, but it may result from diapedesis. Whereas general arteriosclerosis is seen with the dyspeptic and gastralgic forms, the hemorrhagic form is encountered in the absence of any visible sign of arterial degeneration.

The treatment seems to be operative, although theobromin and strophanthin have been recommended. No mention is made of amyl nitrite in relieving the abdominal distress nor of the nitrites, especially nitroglycerin. These measures have performed notable office in cases of angina abdominis, which Dal Lago's case resembles, and much benefit might be had from them in cases of gastric arteriosclerosis.

#### DISEASES OF THE INTESTINE.

Another of Ewald's happy addresses<sup>2</sup> is given us; this time his subject being "Treatment of Intestinal Diseases during the Last Fifty Years." The paper is a very long one, and a review does it scant justice. The author attempts to give in his article a critique of the methods of

<sup>1</sup> 1913, vol. lx, p. 1272.

<sup>2</sup> Berl. klin. Woch., 1913, p. 3.

treatment which have been advocated in the last half hundred years, and from his survey he has picked out two "Leitmotive," as he is pleased to express it. The one "motiv," to use a term borrowed from Wagner's era, is in the minor, the other being in the happy major key. The former, the melancholy motiv, is the recognition of the inapplicability of intestinal antisepsis; the latter is the development of dietetics, and the therapeutic use of the rectosigmoidoscope.

When, fifty years ago, the fundamental importance of the intestinal microorganisms in their relation to disease was being recognized, various medicaments were studied *in vitro* and the results applied to man. All sorts of chemicals were investigated, but with sadly disappointing results so far as their annihilating action on the bacterial flora was concerned. The observation was made that even calomel and corrosive sublimate did not only *not* reduce the number of the fecal bacteria, but that the bacteria increased and multiplied on the mercurial fodder. Nascent oxygen did have an antifermentative action, so hydrogen peroxide was studied, but found to be broken up long before the oxygen reached the intestine.

As grievous as was the failure to effect any benefit from such a procedure, so was it no better with the attempt to reduce the bacterial flora by making the food as mealy as possible, free of organisms. In pediatrics, pasteurized milk has an aseptic action, but in man such a thing is out of the question. In animals, Schmidt showed that there was little difference in the intestinal putrefaction, between sterile food and unheated aliment, and Albu, about the same time, preached the same doctrine concerning man. Ewald has inoculated three fermentation tubes, containing raw milk, boiled milk, and pasteurized milk, with fecal material, and at the end of twelve hours all contained gas, but the sterilized one the greatest amount. The most effective method of ridding the intestines of bacteria is by purely mechanical means, namely, purgatives, which do lessen the number of organisms but prevent in nowise their multiplication. Albu says that intestinal disinfection has only a scientific interest and that if one wishes to limit putrefaction other means must be considered, and to this Ewald appends, "This other means is dietotherapy."

Fifty years ago a rational dietetic treatment of intestinal disease was unheard of, even the text-books speaking of diet in a bashful, shrinking way. A "bland diet" was recommended in many cases, and Ewald quotes the dietetic treatment of chronic catarrhal enteritis as given by Bamberger in Virchow's system, as an evidence of the cavalier treatment which diet received. Ewald considers the great value which a careful stool examination possesses, stating that the more simple the diet is, the easier and the more intelligible will be the result obtained. He is in favor of the test diet of Schmidt and Strassburger to a certain extent, but makes the objection that it is applicable only to

chronic diseases. In acute disorders, the diet must be much more restricted, and he prefers the following which may be used in any condition: 75 to 100 grams zwieback; 100 to 150 grams cocoa or chocolate, made with water or milk; 300 grams rice, cooked with water, milk, or broth. The whole consists of a fluid intake of 1 to  $1\frac{1}{4}$  liters, which is to be taken in the twenty-four hours. This diet in health leaves no residue, and in the brown stool only rests of cocoa and a few starch cells will be found. This diet is kept up for two to three days and the digestion of any one variety of food can be studied by adding the same to the dietary, meat, potatoes, spinach, and so forth. An especial advantage of this diet is that it is absolutely meat-free.

He discusses in some detail gastrogenous achylia (gastrogene achylie) and the fermentative dyspepsia (Gärungs dyspepsia), two diseases which seem to be attracting considerable attention in Germany, at least. The presence of connective tissue in the stools in the former condition, and the occurrence of undigested starch in the latter are of diagnostic importance and both these facts indicate just how much value a simple examination of the stools may be (see Fermentative Dyspepsia).

For the symptomatic treatment of intestinal disease two main conditions are to be considered, constipation and diarrhea. Although he has used hormonal in obstipation, Ewald believes, in view of what has been written, that it is too dangerous to recommend (see Hormonal). He takes the opportunity of urging that new measures be fully guaranteed to produce no ill-effects, and he recommends an official examination of such drugs before they are put in the hands of the profession. So far as drugs are concerned in the treatment of constipation, Ewald believes they should be used as little as possible, and more recourse should be had to diet. Massage is of value but should be practised only by those who have a thorough knowledge of anatomy and not by any rubber or self-styled "masseuse." Electricity is of little value. Hydro-therapeutic measures may be of assistance. Surgery of constipation is discussed, but the cecum mobile idea of Wilm makes little appeal, and Ewald does not wax too enthusiastic over the radical surgical procedures advocated by certain advanced surgeons.

In the chronic forms of diarrhea, the sigmoidoscope is indispensable for treatment, as by it many conditions may be diagnosed early and proper treatment instituted. Ewald warns against the danger which may result from the use of the instrument in inexperienced hands.

**Duodenal Juice (Jejunal Juice) in Man.** Gross<sup>1</sup> has succeeded in introducing his duodenal tube as far as the ileum, a distance of from 150 to 200 cm. The technique and the character of juice aspirated are worthy of description. The small bullet-like end-piece is well moistened with saliva, then swallowed without water. When the mark 45 cm. is reached

<sup>1</sup> Wien. klin. Woch., 1912, p. 1527.

(5 cm. distally from the cardia), the patient is put on the right side and the tube is shoved in until the 70 cm. mark is reached (10 cm. distally from the pylorus). The patient rests for a half- or three-quarters of an hour, after which time the duodenal juice may be extracted. Pushing in the tube does no good after it has been introduced this far, and time is required before the stomach pushes the bullet-like end into the duodenum. When one is certain that the tube is in the duodenum, the tube is shoved to the 150 or 200 cm. mark (jejunum).

The physical characteristics of the aspirated juice at different levels of the gastro-intestinal tract are as follows:

I. The tube in the stomach. On account of the local irritation, there is recovered a transparent, clear juice containing small particles of mucus. The thin fluid with an acid reaction is characteristic.

II. Pars pylorica. Secretion is scanty, thick, mucous in character, gray or light yellow in color, faintly acid or neutral in reaction. The bullet is gripped in the pylorus and no air can be pumped in, and the aspiration is "dry." When the contraction passes off, the next aspiration shows that the tube is

III. In the duodenum. The secretion changes suddenly, there is a free flow of yellowish, cloudy fluid of acid reaction. The cloud results from the mixture of acid gastric juice with the alkaline intestinal juices. There is a precipitation of bile acids and liberation of carbon dioxide. According to Bunge, the latter has for its object the mechanical separation of the particles of food, so that they become more suitable for ferment action. The cloudy appearance soon clears up, and a golden-yellow or greenish, fluorescent, alkaline fluid, the typical duodenal juice, is obtained.

IV. Papilla of Vater. When one is fortunate to obtain juice from this region, the fluid is dark brown and thick.

V. In the jejunum. When the tube is in as far as 150 to 200 cm., the juice becomes light yellow, cloudy, thick, with a neutral or weakly acid reaction.

**Duodenal Mucus.** The unusual finding of duodenal mucus in the vomitus is reported by Schilling.<sup>1</sup>

**Duodenal Stenosis.** Jonas<sup>2</sup> had an opportunity of observing a case of beginning duodenal stenosis, and after having studied the patient clinically, at operation, and subsequently at autopsy, he concludes that the following are of significance in the diagnosis: Absence of any of the usual signs of stenosis of the stomach and bowels, with early appearance of bile in the gastric contents; appearance of obstruction and peristalsis in the dilated duodenum on *x-ray* examination; insufficiency of the pylorus and moderate dilatation of the stomach with absence of any signs of disturbance of motility. The early appearance of bile

<sup>1</sup> Arch. f. Verdauungskr., 1911, vol. xviii, p. 820.

<sup>2</sup> Ibid., 1912, vol. xviii, p. 308.

in the gastric contents should not receive undue emphasis, as it is not at all unusual to find bile when there has been excessive retching and vomiting, both of which lead to regurgitation of the duodenal contents into the stomach. The author seems to have diagnosed "bile" by the appearance alone, an untrustworthy method. I would call the reader's attention to a very good chemical test for bile described by Goodall. Reference will be found to bile in the gastric contents in PROGRESSIVE MEDICINE.<sup>1</sup>

A paper having to do with duodenal stenosis but dealing with it more from the *x-ray* side, is by Schmidt.<sup>2</sup> His conclusions are about the same as Jonas', that is, that there is a dilatation of the duodenum, with obstructive signs and marked evidence of peristalsis in the duodenum.

Congenital occlusion of the duodenum will not be considered here. An excellent monograph with complete literary review is by Cowell.<sup>3</sup>

**Duodenal Ulcer.** In America and England, thanks to the teachings of the Mayos and of Moynihan, the diagnosis of duodenal ulcer has come to be regarded as a very simple matter, indeed, Moynihan believes few diseases have as clear and as definite a symptomatology as *ulcus duodeni*. The fact that duodenal ulcer has not been recognized in Germany with anything like the frequency in America seems like a refutation of Moynihan's contention, however. In PROGRESSIVE MEDICINE, 1912, page 89, I abstracted Ewald's and Bier's papers in which it was stated that the diagnosis was far from easy, the difficulty accounting for the German's failure to recognize the disease. Gruber<sup>4</sup> shows that in ten years 52 cases were autopsied in Strassburg, with the correct diagnosis in but 15.3 per cent., and in Munich, of 88 cases only 10 per cent. were correctly diagnosed. As against this, contrast Moynihan's statistics of 1905 with inability to make a diagnosis in 20 per cent., and today almost every case is recognized! Also contrast Mayo's hundreds of operations with but few incorrect diagnoses.

Albu<sup>5</sup> does not agree with Moynihan as to the definite symptomatology of duodenal ulcer, for he thinks there is neither a uniform nor a constant clinical picture. If one studies carefully the series of duodenal ulcer cases, the only symptom which is fairly constant in all is periodic severe pain. The pain which appears from three to four hours after meals is a characteristic feature, especially when these pains occur at night and are not relieved by food. Albu says the same symptoms appear in hyperchlorhydria, which is only a symptom, according to Moynihan, of duodenal ulcer. Albu insists, however, that there is a hyperchlorhydria of a purely nervous origin (alcohol-tobacco) and

<sup>1</sup> December, 1912, pp. 32 and 72.

<sup>2</sup> Münch. med. Woch., 1913, p. 919.

<sup>3</sup> Quarterly Journal of Medicine, 1912, vol. v, p. 401.

<sup>4</sup> Mitt. a. d. Grenzgeb., 1912, vol. xxv, p. 465.

<sup>5</sup> Therap. d. Gegenwart., 1912, vol. liii, p. 241.

without any anatomical lesion. Another symptom on which Albu lays emphasis is the rapid emaciation in a relatively short space of time. Of the objective signs, an intermittent motor insufficiency of marked degree is the most important. So far as treatment is concerned, Albu believes in internal therapy, and he resorts to surgery only when the internist has exhausted all his resources.

Medicines are of no avail, but he recommends weeks of rest with hot compresses, and a diet consisting of milk, cream, thick soups made from corn, beans, and the like, with butter and yellow of eggs, eggnogs, boiled rice, barley water, etc.

Allard<sup>1</sup> takes exception to the oft-repeated statement that hyperchlorhydria is but an expression of duodenal ulcer, and he warns energetically against the adoption of this, Moynihan's assertion. In this, he and Albu are agreed.

He discredits also the assertion that in ulcer the appetite is very good, and the nutrition is unimpaired, for he believes emaciation is an early and common symptom, and in this belief he and Albu are one.

He is in accord with the comparative infrequency of vomiting as a symptom, but does not hail it as an important diagnostic sign. He finds occult blood a constant sign, wholly neglected by Americans and English, on account of their not including such examinations in their routine. Allard extols the finding of blood in the feces and not in the gastric contents as a valuable sign, and recommends Einhorn's test. The latter consists in having the patient swallow a string and then measuring the distance the brown discoloration (blood) appears. If the spot is seen 55 to 65 cm. from the incisor teeth, duodenal ulcer is present.

He concludes his article (the caustic bite of his pen perhaps classes it as an invective against American and English surgeons) by saying that to lay so much stress on the character of the pain is not conducive to the advancement of the diagnosis of duodenal ulcer. He modestly states that the infrequency of the diagnosis of ulcer in Germany is because "Wir Deutschen seien hier eigentlich zu exact vorgegangen" (We Germans have been really too exact in our methods). He says Ewald's recommendation to make an exploratory laparotomy does not meet with his (Allard's) approval, if the laparotomy is advised on the basis of an American anamnesis (sic).

A devoted follower of the teachings of Moynihan, Mayo, and the Anglo-American school is to be found in Kreuzfuchs,<sup>2</sup> who contributes an admirable article, though not new in thought. In marked contrast to Allard, Kreuzfuchs lays great emphasis on the history of the case. He acknowledges that there are histories which so closely mimic the details of a true ulcer history that a wrong diagnosis is sometimes made. Moynihan himself insists on this, but the number is very small, but

<sup>1</sup> Med. Klin., 1913, p. 523.

<sup>2</sup> Ibid., p. 444.

2 per cent. according to him. Allard is evidently unaware that Moynihan makes an occasional exception to the statement "History is everything in the diagnosis of duodenal ulcer." Kreuzfuchs believes the most characteristic symptom of all is the repeated attacks of pain with intervals of absolute freedom from discomfort.

**DIFFERENTIAL DIAGNOSIS BETWEEN GASTRIC AND DUODENAL ULCER.** Sommerfeld<sup>1</sup> has tabulated the symptoms occurring in 44 cases of ulcer of the stomach and duodenum. 11 were ulcers of the stomach somewhat removed from the pylorus, 12 were true pyloric ulcers, and 21 were duodenal ulcers. The occurrence of these symptoms was estimated in percentage, and although this is by no means a reliable means of obtaining a true symptomatology, nevertheless the results furnished were interesting. There are many tables in the article which one is tempted to reproduce, but the final summary will perhaps suffice. Sommerfeld believes that there is no one symptom peculiar to gastric ulcer, pyloric ulcer, or duodenal ulcer, which serves in any case to distinguish one kind of ulcer from the other. Especially important for the diagnosis of duodenal ulcer is the periodicity of the symptoms which is never lacking in the history; of less importance, but still valuable as a symptom, is pain sometimes after eating. He holds that the localization of the pain is significant, as the following table will show:

	Ulcer at a distance from pylorus.	Pyloric ulcer.	Duodenal ulcer.
Pain in epigastrium	70 per cent.	50 per cent.	38 per cent.
Ulcer pain to right	10      "	42      "	62      "
Ulcer pain to left	20      "		

He does not attach too much importance to the history, on which alone a diagnosis can never be made, as gastric ulcer often is expressed in the same symptomatology.

Very good clinical histories with report of the *autopsia postmortem*, or *autopsia in vivo*, accompany Sommerfeld's admirable paper.

**X-ray Diagnosis.** So far as the *x-ray* is concerned, the diagnostic features seem to be changes in the peristalsis and motility of the stomach. It was Barclay, I believe, who first observed increased peristalsis and early emptying of the stomach, and since his paper, these phenomena have been repeatedly seen and their importance confirmed. Müller<sup>2</sup> devotes a comprehensive and instructive paper to the *x-ray* diagnosis of duodenal ulcer, his observations being conducted on twenty-two cases of this disease. There was always lively peristalsis of the stomach, so that this may be regarded as a constant feature of the condition.

The motility in Müller's cases was delayed in all but eight, four of the stomachs being normal in tone and four ptosed organs. In the

<sup>1</sup> Arch. f. Verdauungskr., 1913, vol. xix, p. 1.

<sup>2</sup> Mitt. a. d. Grenzgeb., 1913, vol. xxvi, p. 82.

hypertonic stomachs, that is, in the viscera with exaggerated peristalsis, there was usually delayed motility of such degree that the stomach showed a six-hour retention. Ptosis of the stomach did not interfere materially with its emptying power, in fact, motility of the stomach, Müller claims, is not interfered with at all by the change in form of the stomach. He believes that the cause of the delayed motility is to be seen in an energetic closure of the pylorus, to use Kreuzfuchs' expression (though why the term "pylorospasm" does not express the same idea I do not know), which leads to an organic stenosis of the duodenum. The degree of peristalsis is no index, therefore, of the emptying power of the stomach.

Dextroposition of the pylorus is an infrequent feature, being found but five times in Müller's series, the most pronounced degree being seen in the cases of pyloroptosis with periduodenitis. Insufficiency of the pylorus, a feature emphasized especially by Haudek and Kreuzfuchs, is frequently met with, and to such a degree that one can see the patulous open pylorus with a bismuth meal. Normally, be it remembered, the pylorus contains no bismuth after a meal of this metal, as the food passes quickly and completely through the opening and none is there retained. Müller says in from five to ten minutes after the taking of a meal after forceful peristalsis has begun, he has seen the pylorus close incompletely and for a long time, little strips of bismuth appearing in the pylorus. The insufficiency may be so marked that even after bismuth has reached the jejunum, the bismuth is still retained in the pylorus.

Retention of bismuth in the depression of an ulcer, seems to be regarded as an important sign of duodenal ulcer by practically all observers. Haudek first reported the duodenal shadow which persisted after most of the bismuth had left the intestine, and his findings are fully confirmed by Kreuzfuchs<sup>1</sup> and by Müller. The former, while admitting that not all cases of duodenal ulcer present this shadow, yet confesses, when it is seen, it must be regarded as a pathognomonic sign. Kreuzfuchs warns us not to mistake for this a retention of bismuth which is sometimes seen in the absence of ulcer. This shadow may reach the size of a dime, but is not persistent in one place and in one form, but changes its shape continuously. The cause of this rare performance is not understood, but the author suggests that it may be due to a kink of the duodenum in cases of gastrophtosis.

See also Baron and Bársony<sup>2</sup> and Eisler and Kreuzfuchs.<sup>3</sup>

**PERFORATION OF DUODENAL ULCER.** It is important to remember that a duodenal ulcer may perforate without having given rise to any symptoms of ulcer or without any premonitory signs of perforation. In such cases, the diagnosis is very difficult, and the true condition is often

<sup>1</sup> Berl. klin. Woch., 1912, p. 1568.

<sup>2</sup> Wien. klin. Woch., 1912, p. 1521.

<sup>3</sup> Ibid., p. 1526.

mistaken for appendicitis. If this seems to the reader a bit of Eastern hyperbole, he has but to peruse the article by Power<sup>1</sup> to find a report of 5 cases which corroborate the above. In each of these 5 a distinctive feature was, that the subject believed himself to have been perfectly healthy up to the time of his disaster, illustrating the fact that previous indigestion is unusual in duodenal ulceration. Power says "the absence of a history of dyspepsia with the signs of sudden perforation in an otherwise healthy man, inclines one at once toward an exploration of the duodenum."

The symptom of perforation, *i. e.*, pain, is sudden, with any exciting cause, and the agony is very severe. Power claims he never thinks of appendicitis in such cases, any more than he does of perforated gastric ulcer, but I believe, nevertheless, that this diagnosis is frequently made. After the first shock, appendicitis seems excluded, for the abdominal symptoms subside as the initial shock becomes less. The prognosis is good; Power's five cases all recovered.

It would seem that perforation of a duodenal ulcer is much more common than perforation of a gastric ulcer, for in the space of twelve months, Evans<sup>2</sup> has operated on 7 cases. He is agreed that duodenal ulcer may remain symptomless until hemorrhage or perforation occurs.

**TREATMENT OF DUODENAL ULCER.** The treatment of duodenal ulcer is surgical. Practically all the cases operated upon for duodenal ulcer have been under the care of internists for a number of years without any benefit having been derived by the patient. Once the diagnosis is made, an operation should not be delayed, as only by surgical interference is duodenal ulcer ever cured.

Einhorn<sup>3</sup> suggests that use be made of his so-called thread test in his treatment of duodenal ulcer. In addition to the duodenal alimentation about which he has written so much, he recommends a local application of protargol, in the following formula:

This solution is heated on a water-bath until it becomes of syrupy consistence, and at that point in the duodenal tube which the thread test has shown to be the bleeding point, this syrup of protargol is smeared on the tube, allowed to cool and stiffen in the air, then hardened in 5 per cent. formalin solution for a half-minute and then dried.

Einhorn claims to have seen marked improvement after local treat-

<sup>1</sup> *Lancet*, 1912, vol. ii, p. 67.

<sup>2</sup> Medical Press and Circular, 1913, vol. cxlvi, p. 252.

<sup>3</sup> Berl. klin. Woch., 1912, p. 1419.

ment applied in this way, although the number of cases benefited is not strikingly large.

**Insufflation of Oxygen.** Gross<sup>1</sup> makes use of the duodenal tube for introducing oxygen into the intestine, a treatment used with much benefit in cases of *fermentative dyspepsia*, and in cases where intestinal antiseptics are indicated. The duodenal tube is introduced to the mark 90 cm., which is 30 cm. beyond the pylorus, the deep exploration preventing the return escape of too large quantities of oxygen into the stomach. During the first week the patients received one insufflation daily, in the second week, one insufflation every second day, in the third week, one insufflation every three days. Gross endeavored to give a continuous oxygen "bath" lasting from an hour and a half to two hours. In cases in which there are gross anatomical changes (colitis, typhlitis) anal insufflation may be used in combination with the jejunal method, or alone.

In the treatment of intestinal diseases, as we have read in Ewald's address, nascent oxygen does inhibit bacterial proliferation in the intestine, but the difficulty of introducing it into the bowel has been so great that this scientific fact has never received practical application. By insufflation of oxygen, a method first described by Schmidt,<sup>2</sup> directly into the intestine it would seem we have a great improvement over the method heretofore suggested.

**Peristalsis and Antiperistalsis of the Large Intestine.** Until a paper appeared by Holzknecht, in 1909, there had been no definite statement concerning the mechanics of the propulsion of fecal material in the large intestine. This author, merely by chance, observed evidences of peristaltic movement in two cases, and he concluded that the large intestine is normally at rest for the greater part of twenty-four hours, that during this time there are three or four vehement contractions of the gut, lasting only a few seconds, but being instrumental in propelling the ingesta for a third the length of the intestine. This opinion, though differing from that generally held, was more or less disputed by Schwarz, who endeavored to show that the large intestine of man was never at rest, but that it was continually and periodically in motion.

In a study of the normal peristalsis, by the aid of certain laxatives, Meyer Betz<sup>3</sup> has come to a similar conclusion. The practical lessons to be drawn from the latter's work are, that the stomach and the rectum comprise the principal reflex depots whence go the stimuli to the intestine. An injection of glycerin causes a reflex contraction of the intestine, first in the rectum, then the descending colon, sigmoid, and finally the hepatic flexure is forced into activity. This imitates very closely the

<sup>1</sup> Medical Record, 1912, vol. lxxxii, p. 986.

<sup>2</sup> Zentralbl. f. inn. Med., 1912, No. 1.

<sup>3</sup> Münch. med. Woch., 1912, p. 2715.

desire to defecate when the rectum contains feces. The principal physiological stimulus for intestinal peristalsis is to be seen in the stomach, and this best performs its function when food is taken at regular intervals. The laxatives which Meyer-Betz found to produce the maximum intestinal movements were those which liquefied the fecal mass, as castor oil, jalap, and the various salts. (See also *Münch. med. Woch.*, 1912, S. 1793.)

Kretschmer<sup>1</sup> believes that food itself exerts some influence on intestinal peristalsis, and depending on whether the dietary is bland or stimulating, there will be differences in the peristaltic waves. The following cuts show the extent to which the food has gone at certain intervals of time.

In Fig. 6 there is a considerable amount in the last loop of the ileum. The colon is filled from the cecum to the hepatic flexure. In Fig. 7 there is nothing in the ileum, and the colon is filled to the splenic flexure. Fig. 8 shows the intestine filled to the splenic flexure at the end of twenty hours, while in Fig. 9 on the coarse diet, at the end of the same time, the descending colon is beginning to be filled. In Fig. 10 the ascending colon has emptied itself and the barium has reached the sigmoid, while in Fig. 11 the transverse colon has begun to empty, and the ampulla recti is beginning to be filled. It will be seen that the greatest difference is observed in the small intestine and in the upper portion of the colon during the first six hours. After this time, the coarse meal was as far as the bland food at the end of twenty hours, while at the end of thirty hours there was scarcely any difference to be noted.

A somewhat similar work is that of Schwarz<sup>2</sup> who studied the effect, on a perfectly normal man, of a diet of uniform consistency. The result obtained was, that the food taken was propelled as far as the sigmoid and rectum on the first day, and that the bowel movement of this day contained only a small portion of the test diet taken the day before. The remains in the colon become broken up and are mixed intimately with the next day's food, and not until the third day, *i. e.*, with the second defecation, is the food of the first day completely discharged from the intestine.

In the section on Constipation, will be found mention of the theory that stagnation of fecal material is due to *antiperistalsis*, an act, or a series of acts, which prevents the food remains from leaving a certain portion of the intestine. This *antiperistalsis*, or *anastalsis*, was observed by Cannon in the cat in 1902, but his results have never been applied to man, not for lack of endeavor be it understood. The evidence of anastalsis in the human proximal cecum is purely inferential, and has been derived from a study of cases of fecal fistula. In these instances, it is claimed that enemas have escaped from the fistula, thus proving

<sup>1</sup> *Münch. med. Woch.*, 1912, p. 2334.

<sup>2</sup> *Deutsch. med. Woch.*, 1912, p. 1316.

that the material has travelled the entire length of the colon. With the *x-ray*, too, the contents of the cecum and of the ascending colon

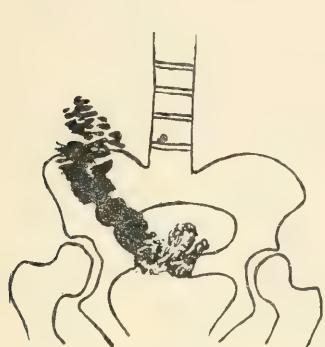


FIG. 6

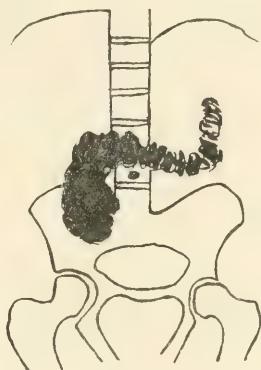


FIG. 7



FIG. 8

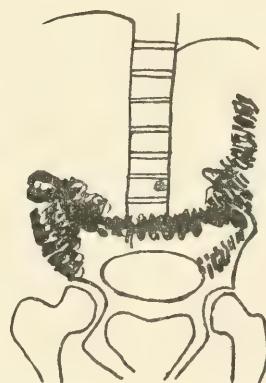


FIG. 9

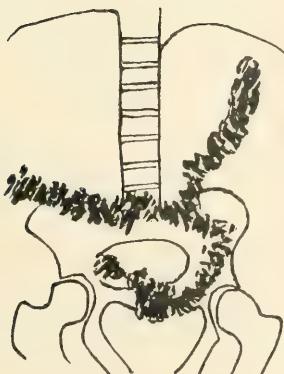


FIG. 10

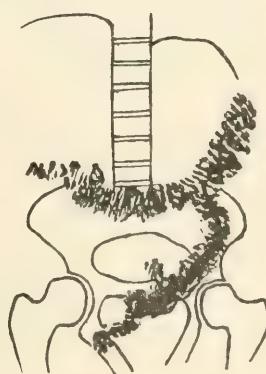


FIG. 11

have been seen to go on to the transverse colon, and after a slight pause to be pushed back to the proximal portion. To these observations, Cannon replies:<sup>1</sup> "Although the escape through cecal fistula of material introduced distally into the colon clearly demonstrates a backward current in the human large intestine, although the long retention of material in the cecum is good evidence of retarded progress, and although the retrograde transport of material in the proximal colon can



FIG. 12.—Diagram of normal fecal mass after twenty-four hours.



FIG. 13.—Hypokinetic obstruction forty-eight hours after eating.



FIG. 14.—Hypokinetic constipation one hundred and twenty hours after eating.

be interpreted as due to a backward pressure, nevertheless these facts do not prove the presence of anastalsis, in the sense of visible waves passing backward over the intestinal currents." He quotes Hertz as having examined the intestine for a long period of time without observing this phenomenon.

<sup>1</sup> Journal of the American Medical Association, 1912, vol. lix, p. 1.

*Defecation.*<sup>1</sup> As in the cat, a relatively long column of feces is passed out at one time and, according to Hertz, the entire large intestine below the splenic flexure is normally evacuated at a single stool. Schwarz holds that the colon can empty itself from the ascending portion to the rectum and accounts for the mushy consistence of the final portion of a movement.

In man, the waste material accumulating in the distal colon normally stops at the acute angle between the pelvic colon and the rectum. When the pelvic colon becomes distended, this angulation is widened and the fecal material is ready for advancement. When it enters the rectum there is a desire to defecate, which is further augmented by the taking of food in the stomach, and increased by the exercise of rising and dressing, hence the explanation for the performance of the act after breakfast. The act of defecation itself is accomplished by increased intra-abdominal pressure and by a reflex contraction of the walls of the intestine. The contraction of the diaphragm pushes the entire transverse colon downward, and forces the ascending colon and cecum into a globular mass. As a result of this increased intra-abdominal pressure, the rectal pressure becomes from four to eight times that of normal, *i. e.*, 100 to 200 mm. of mercury. This pressure, in turn, causes more material to enter and to distend the rectum, which being distended, calls forth reflex diastaltic contractions of the colon, which cause still stronger contraction of the abdominal muscles and brings about relaxation of the anal sphincters. It is said that defecation nine hours after breakfast rids the body of food debris taken the same day, but this time may vary between nine and thirty-two hours.

An article which pursues a similar tenor is by Keith.<sup>2</sup> Last year I abstracted at great length Lane's article on "Kinks" as a cause of intestinal stasis, with the dire effects which the last named has on the human organism. Keith rather ridicules the views of Barclay, Smith, Metchnikoff, and Lane regarding the uselessness and injuriousness of the large intestine, and says that before one assigns so large a part of man's digestive tract to the category of good-for-nothing structures, it might be well to inquire into the function of the great bowel as a whole. He confesses that we know but little, and then proceeds to summarize the "guesses" which have been made of the significance of the large intestine. The article is a most timely one.

**CONSTIPATION.** For the explanation of abnormal stagnation of fecal material in the bowel, and antiperistaltic action of the bowel has been called into play. The work of Cannon on the cat (see Peristalsis and Antiperistalsis of the Large Intestine) has without further ado been held to be applicable to man, and Roith especially has been most eager

<sup>1</sup> Cannon, Journal of the American Medical Association, 1912, vol. lix, p. 1.

<sup>2</sup> British Medical Journal, 1912, vol. ii, p. 1599.

in the support of the antiperistaltic theory. Bloch<sup>1</sup> believes that he has seen a transport of material from the transverse colon to the cecum, and Stierlin<sup>2</sup> is also of this opinion. Albrecht<sup>3</sup> reports a case which he thinks proves conclusively that the fecal column can be moved backward toward the mouth. His was a patient in whom an ileo-sigmoidostomy had been performed, but who, despite the fact that the cecum was blocked off from the mouth, developed a fist-sized fecal tumor in the right iliac fossa. The transverse colon was also filled with fecal masses, and Albrecht believes that this can be explained only on the basis of antiperistalsis.

Von Noorden<sup>4</sup> reports a case which illustrates what serious complications chronic spastic constipation may have. The case is similar to the condition described by Payr, in 1910, and as there has been no mention in PROGRESSIVE MEDICINE of this work, I shall review it in brief. The symptoms are caused by a benign stenosis of the large intestine at the angle the transverse colon makes with the descending colon, so that the physiological obstruction at this point is exaggerated. There is a corresponding muscular hypertrophy of the bowel as far as the cecum. The cause of the obstruction is numerous cicatrices of the serosa.

There is at first chronic constipation gradually increasing in degree, and made worse by medication (laxatives, etc.), by large meals, and by foods tending to cause fermentation. There is constipation for a few days, then a vehement passage with much gas. The stools are not diarrheic but contain scybalaous masses in the watery fluid, and they are very offensive. The cecum is painful on palpation, and the entire large bowel may be found to be greatly distended with gas. These alternating attacks of diarrhea and of constipation imperil the patient's health, as he is afraid to eat. He may be brought to such a state from undernutrition and auto-intoxication that the condition may readily be mistaken for carcinoma.

Payr describes an acute form developing in perfectly healthy individuals, especially in those who lead a sedentary life after a life of great activity. In these cases the picture is that of peritonitis, with paralysis of the intestinal musculature and fecal vomiting. Von Noorden's patient was of the chronic type and simulated, in many particulars, cases of pelvic peritonitis. The *x*-ray examination cleared up the diagnosis, revealing an ascending and transverse colon as thick as a man's arm, with scarcely an indication of the splenic flexure. The colon was so greatly distended that it compressed the stomach to such an extent that only two-thirds of the organ could be seen.

<sup>1</sup> Med. Klin., 1911, No. 6.

<sup>2</sup> Münch. med. Woch., 1911, No. 36.

<sup>3</sup> Ibid., 1912, p. 1592.

<sup>4</sup> Zeitschr. f. klin. Med., 1912, vol. lxxvi, p. 417.

**TORPOR RECTI (DYSCHEZIA).** Under the heading Defecation, I mentioned that the filling of the rectum with fecal material constitutes one of the stimuli to defecation. Ordinarily, as we know, the rectum is empty, and only when a bowel movement is about to take place does that portion of the intestine become distended with feces. In 60 per cent. of the cases of constipation, according to Gant, the rectum is full, and Singer<sup>1</sup> has called this condition torpor recti or dyschezia.

As explanation of this artificial inhibition of the normal act is held responsible. Irregularity, lack of education concerning the importance of daily and regular bowel movements, and false modesty are probable causes which arise in youth, bringing about inhibition of the normal act of defecation. The composition of the food plays a role, meat leaves little residue, while the cellulose-rich foods give plentiful waste material. Too rapid or too free absorption of water (Greedy colon of Hertz) is held by Singer to be an important factor in diminishing the volume of the fecal mass.

By "dyschezia" is meant the condition whereby the rectum fails to be emptied at each defecation. Two forms are described.

1. Insufficient defecation.

2. Obstruction to a complete defecation.

As *treatment*, enemas are imperative, and Singer recommends water, chamomile infusion, warm oil, ol. hyosciami, oil with bromipin and liquid paraffin, used morning and night. The paraffinum liquidum is especially well thought of.

I would direct the reader's attention to a form of treatment described by Fernet<sup>2</sup> which I have frequently used, and with excellent results in such cases as reported by Singer.

A paper devoted to the consideration of mechanical measures suggested for constipation is by Kahane.<sup>3</sup>

The following diet is recommended by Newburgh.<sup>4</sup>

Breakfast: Fruit: apple, grapes, or berries. Cereal: large helping of oatmeal, cracked wheat, or corn-meal. Eggs in any form. Bread: Graham or whole wheat, bread toasted or not. Coffee or tea.

Luncheon: Small helping of fish or meat, with a large helping of spinach, cauliflower, cabbage, tomatoes, green peas, or beans. Two or more slices of whole wheat, Graham bread, or oatmeal crackers. Dessert as desired.

Dinner: Unstrained vegetable soup. Small helping of meat, fish, or poultry; baked potato ("jacket"), and all peas, beans, spinach, and cauliflower; salad, made from lettuce, celery, or asparagus; bread as at luncheon; dessert as desired; coffee.

<sup>1</sup> Med. Klin., 1912, p. 1940

<sup>2</sup> PROGRESSIVE MEDICINE, December, 1912, p. 102.

<sup>3</sup> Med. Klin., 1912, p. 1633.

<sup>4</sup> Boston Medical and Surgical Journal, 1913, vol. clxviii, p. 757.

A new remedy to be used subcutaneously, *sennatin*, has been prepared from senna leaves by Credé.<sup>1</sup> It is said to stimulate the intestinal activity to such a degree that large evacuations speedily follow in every case. The dose is one to three grams, but two grams is the normal adult dose, given preferably intramuscularly in the gluteus. The effects of the sennatin are noted in three to four hours, then gas is evacuated "very often in an almost tempestuous manner (sehr oft in fast stürmischer Weise)," and if the anus is small, a rectal tube must be inserted! Three to four hours later, the abdominal tempest is a little subdued, but whether there is a movement or not depends on the character of the fecal mass, and the presence or not of a mechanical obstruction. A glycerin enema seems to reinforce the action of the sennatin.

Sennatin is said to be particularly effective in paralysis of the intestine, in infections, peritonitis, and in ileus. 201 cases have been studied, with good results in 83 cases. Intestinal adhesions are prevented by timely use of sennatin! There have never been any unpleasant effects. The lesson which has been taught by hormonal is trenchant, and one should proceed cautiously with any subcutaneous medication for constipation.

"A little learning is a dangerous thing,  
Drink deep, or taste not the Pierian Spring,  
Their shallow draughts intoxicate the brain  
And drinking largely sobers us again."

*Hormonal.* The articles which have appeared since I wrote on hormonal in PROGRESSIVE MEDICINE, December 1912, have not been conducive to a safer feeling concerning its use in chronic constipation. I warned against its employment, pleading that testimony so far submitted had shown that it was by no means harmless. Dittler and Mohr<sup>2</sup> have continued their experimental research which, so far as I can judge, seems to establish conclusively the status of hormonal. The latter substance, be it remembered, was discovered by Zuelzer<sup>3</sup> after he had concluded that the normal intestinal peristalsis was excited through chemical channels by a hormone. In conjunction with Dohrn and Marxer, he believed that the substance was to be found in the gastric mucosa of animals at the height of digestion, and that when injected intravenously it produced peristalsis which imitated closely the normal intestinal movements. Zuelzer considered this substance, which he christened "hormonal," a specific peristaltic hormone. Zuelzer and his co-workers,<sup>4</sup> having found that the spleen contained considerable

<sup>1</sup> Münch. med. Woch., 1912, p. 2868.

<sup>2</sup> Zeitschr. f. klin. Med., 1912, vol. lxxv, p. 275

<sup>3</sup> Berl. klin. Woch., 1908, No. 46.

<sup>4</sup> Med. Klin, 1910, No. 11.

quantities of this hormone, whereas other organs were deficient therein, believed that this hormone was stored in the spleen, and it was the extract from this organ which he put on the market under the name "hormonal."

A careful critique of the historical side of the subject may be found in Dittler and Mohr's article, also the report of a remarkably painstaking research. The latter showed that the spleen extract (hormonal) differed in nowise from extracts from other organs, namely, stomach, intestine, brain, pancreas, and blood, and, furthermore, that the phenomena following the injection of hormonal were duplicated with peptone (Witte). Immediately following the injection there is a decided depression of blood-pressure, which may disappear in a few minutes, but which may persist for a long time, according to the amount of hormonal used, but which is accompanied by marked changes in the cardiac and respiratory functions. There is an unquestionable lowering of the coagulation time of the blood, and marked salivation. Dittler and Mohr found that hormonal but rarely aroused peristalsis in animals. Popielski<sup>1</sup> believed the peristaltic action was secondary to the lowered pressure, but this is not exactly true, as the pressure was lowered in every case, but peristaltic action was observed in but few. Owing to the serious effects which hormonal has on the cardiac vascular system, the authors believe it is questionable whether its use is indicated in man. The good results following its use they conjecture may be due to suggestion, coupled with a well-regulated diet.

Sackur<sup>2</sup> has approached the subject from the experimental side also and discredits the findings of Dittler and Mohr, v. Sabatowski, Popielski, and many others whose work I quoted last year. He found that there was no alteration in blood pressure, and that peristalsis was aroused quite independently of depression of the former, and was almost always a constant phenomenon after hormonal injection. Sackur had been discouraged in the clinical application of the drug by the cry of "Danger" shouted by clinicians, but since his experimental work has shown the innocuousness of the remedy, he recommends, in no equivocable manner, its use in paralytic ileus, postoperative intestinal paresis, and, in simple atonic constipation.

Two enthusiasts for hormonal are to be found in the persons of Kausch<sup>3</sup> and Bovermann.<sup>4</sup> The former writes a lengthy article on three cases which had diarrhea following its use, and the latter, although he reports an unfavorable case, says it were a great pity to abandon a remedy of marked value in postoperative intestinal paresis, just because of unfavorable effects, which he ingenuously remarks, "seem however, to be not infrequent."

<sup>1</sup> PROGRESSIVE MEDICINE, December, 1912, p. 104.

<sup>2</sup> Deutsch. med. Woch., 1913, p. 401.

<sup>3</sup> Berl. klin. Woch., 1912, p. 1608.

<sup>4</sup> Münch. med. Woch., 1912, p. 1553.

Kausch ascribes all these bad effects to the presence of albumose, and Schönstadt,<sup>1</sup> having had unpleasant experiences, says it is most regrettable that physicians should be recommended to use a preparation which contains a substance so harmful, for he adds he was in his first case "im höchsten Grade bestürzt und erschrocken." This case, it might be stated, died.

Kleinberger<sup>2</sup> adds his evidence to the harmfulness of hormonal, and says it should be used only in healthy subjects, and then only when all the bad effects are made known to the patient, who should be familiar with these facts before giving his consent.

For good measure, I continue to question its value, this time armed with a paper by Mühsam<sup>3</sup> entitled, "Vorsicht mit dem Hormonal" (Be careful with Hormonal). Mühsam's patient suffered with severe collapse, but was apparently saved by drastic measures immediately applied. Voigt<sup>4</sup> had a similar experience following hormonal, against the use of which he emphatically warns.

Zuelzer<sup>5</sup> takes exception to this last paper, as he says Voigt's article was submitted in May and printed in November, and that he, Zuelzer,<sup>6</sup> in the meantime had discovered that albumose was the cause of the collapse, etc., and that the new hormonal did not contain this substance. He claims that Voigt's paper is misleading, as it is apt to give the impression that this new hormonal is dangerous. Zuelzer says from now on all hormonal will be tested "clinically" by him so that it may be put on the market free from danger. Voigt replies that he is glad albumose is now eliminated, but this should have been the case with the first preparation. I cannot refrain from calling attention to the unusual measures Zuelzer is using to prove the harmlessness of his preparation. His words are, that, "von nun ab nur noch ein von mir klinisch geprüftes Hormonal abgegeben wurde" (From now on only a hormonal clinically tested by me will be sold). Where does he obtain his experimental clinical material? Lives must be held cheaply in Germany, or else the zeal for advancing science is a quality as common in the lay German organism as it is in those of a more scientific turn of mind. Zuelzer's test reminds one of a means suggested for telling the difference between mushrooms and toadstools.

In justice to hormonal, I must refer to Glitsch,<sup>7</sup> who reports enthusiastically of results obtained. He appends bibliography of the authors who also have had good results with hormonal.

**Auto-intoxication.** Feeling toward this term as the ancient peoples felt toward those sick of a leprosy, I avoided its use last year and

<sup>1</sup> Münch. med. Woch., 1912, p. 2277.

<sup>2</sup> Ibid., p. 1613.

<sup>3</sup> Therap. d. Gegenwart, 1912, vol. liii, p. 314.

<sup>5</sup> Ibid., p. 798.

<sup>4</sup> Therap. Monatsh., 1911, vol. xxvi, p. 708.

<sup>6</sup> Deutsch. med. Woch., 1912, p. 1233.

<sup>7</sup> Arch. f. Verdauungskr., 1912, vol. xviii, p. 466.

skirted around the subject perhaps too cavalierly. The amount of work which has been published since my former article demands some review, and whether the article is labeled "alimentary toxemia," "intestinal putrefaction," or any of the euphonious names with which a very complicated subject has been graced, the underlying idea of an auto-infection toxemia or intoxication is the same in each. In England, a special meeting was held for the purpose of discussing "alimentary toxemia," and in this symposium were found Hale White, Andrews, Saundby and Lane, whose papers may be read in the *British Medical Journal*, 1913, vol. i, p. 537.

Hale White writes: "The term 'alimentary toxemia' at once shows our ignorance, for it is unscientific to group cases of poisoning according to the point of entrance of the poison; they should be grouped according to the variety of the poison. Further, the term is too wide; an illness due to any poison absorbed anywhere from the mouth to the anus is strictly an alimentary toxemia, but the phrase would hardly cover a case of opium poisoning. The user of it probably wishes to suggest that an illness is due to poisons made by microorganisms resident in the alimentary canal, although with our present knowledge, he can never name the poisons, nor is he certain of the offending microorganisms; still we are equally ignorant of the poison in uremia and diabetic coma. But it is not clear that it may not be used when microorganisms from the alimentary tract, for example, *Bacillus coli*, pass into the blood and so cause illness, and it is somewhat confusing that if infected food causes poisoning we talk of food poisoning and not food toxemia; on the other hand when the food is not infected by pathogenic microorganisms, but makes the person who eats it ill, he is, by some, said to be suffering from alimentary toxemia; for example, as in a person who has urticaria after eating strawberries."

This paragraph, with which White begins his General Introduction, is followed by a general survey of the direction toward which future work must point. I am fully in accord with this sentence, "Much work has been done on the excretion of indican and ethereal sulphates in the urine, and there is no doubt that an excess of indican is often associated with serious intestinal disturbance, but many persons pass large amounts of indican for many years and remain in good health; on the other hand, indican is not passed in many instances in which the patient might be thought to have alimentary toxemia." White discusses the fatuousness of ascribing to any one chemical the entire responsibility of producing an intoxication, for the relations existing between the intestinal flora and the medium, the food, are too complex. The effect of retention of feces is not seriously considered, despite the wide acceptance of the intestinal stasis theory. His judgment is sane when he argues that, because two phenomenon are coexistent, this does not prove that they stand in the relation of cause and effect. Many of the kinks, etc.,

which produce intestinal stasis are no more common in those suffering from intestinal toxemia than in those who are not.

As regards symptoms, the epitome of penetration is reached in this admission: "I am one of those who think it probable that they (meaning symptoms) are due to alimentary toxemia, but the poison has never been found, the symptoms have never been produced experimentally, few observers have up to the present, even given an opinion on the matter, and in their extreme degree these symptoms are, in my experience, decidedly rare, yet we find it definitely stated, time after time, that these symptoms are due to alimentary toxemia, but I submit that the evidence does not amount to proof, although it renders the suggestion probable." Last year, I inveighed against the loose way in which the term auto-intoxication is used, and I rejoice to see this, "If we are not careful, we shall, before we know where we are, be invoking the aid of alimentary toxemia in the same reprehensibly loose way as gout, uric acid diathesis, and congestion of the liver have been called in to explain various vague symptoms which we do not understand."

The second paper in the symposium was devoted to the bacteriology of the alimentary canal. The first part, having to do with the nature and properties of the bacteria inhabiting the intestines I shall not review, as the ground was covered last year in PROGRESSIVE MEDICINE, p. 95. Andrewes, too, condemns the loose use of the word alimentary toxemia, and his definition is, that condition which results from the absorption from the alimentary canal of chemical poisons, of known or unknown composition, in amounts sufficient to produce clinical symptoms. Not all alimentary toxemias are of bacterial origin, as the fault may be in the liver, which, through disease, is not able to perform its detoxicating functions as before. Or, again, the bacteria may, under certain conditions, carry out protein cleavages beyond the capacity of the ordinary digestive ferments, and these products are found in such excess that the body is unable to neutralize them, and intoxication results. This view is the one generally held, and most of us will agree with Andrewes that there is little evidence at the present time to show that soluble or intracellular toxins derived from the ordinary intestinal flora play much part in alimentary toxemia.

To Saundby was assigned the symptomatology and treatment of the disorder, but in the former he goes far afield and confuses when he should enlighten. It is not my conception of the subject to include in it food poisons, vegetable and animal. The indications for treatment are: (1) to cut off the supply of the material; (2) to reinforce the digestive juices, and to introduce; (3) bacterial activity; (4) drugs and hydrotherapeutics into the régime. I shall consider these in order.

1. Saundby recommends gastric lavage followed either by fasting, or by small amounts of milk or barley water. Such cures as the fruit cures, the Salisbury diet, and Schott's dry diet have starvation as the fundamental idea.

2. One of the best means of stimulating the gastric juice is by efficient mastication. Although developed to an unreasonable degree by Fletcher, chewing the food has no doubt a salutary effect on the subsequent course of digestion.

3. There are certain bacteria which seem to be able to check the action of putrefactive and pathogenic bacteria, and of the ordinary organisms which play their useful role is the lactic acid bacillus made famous by the researches of Metchnikoff. Buttermilk, Bulgarian sour milk or Yoghourt, all of which contain this bacterium, are to be recommended.

4. The sterility of the stomach seems to depend on the presence of a sufficient amount of hydrochloric acid and pepsin, and where the power is deficient hydrochloric acid or nitrohydrochloric acid may be administered. So far as drugs are concerned, especially those drugs which are called intestinal antiseptics, very few are efficacious.

5. Drinking of copious amounts of warm saline waters is efficacious, particularly those containing magnesium chloride or sodium phosphate or sulphate. Irrigation of the intestine when used with care may be found of benefit, but there is always a danger of inducing atony of the bowel.

Lane's paper formed the fourth of this interesting symposium. His views I gave at length last year, page 111, so I shall not repeat them here. He recommends, in no uncertain manner, operative procedures, claiming that, "within a few hours of the operation, the patient asserts that she is quite different, and that she has lost that feeling of intense misery and depression from which she has suffered for years."

In this connection I would call the reader's attention to some interesting papers to be found in the *British Medical Journal* for April 19, 1913, and also a fascinating article warning against "kinks" by Sir James Goodhart in the *Lancet*, May 17, 1913. Another paper which supports Goodhart's warning is contributed by White<sup>1</sup> and an admirable editorial on the symposium is printed in this same journal, May 31, 1913.

Von Noorden<sup>2</sup> sketches entertainingly the development of the subject of auto-intoxication, a term which he abhors, and after denying all science and practicability in the work of Combe, he proceeds to describe a special form of intestinal intoxication which he has studied in the course of recent years. He pictures the symptomatology of the condition in detail, the chief features of which are a sensory polyneuritis of a mild grade, with a pronounced condition of irritation in the vagus area. As indicative of the latter are to be found retardation of the pulse, extrasystoles, abnormal tonicity of the sigmoid flexure, hyperacidity, dermographia, and increased insensible perspiration.

As evidence that the changes in the peripheral nerves and in the

<sup>1</sup> Arch. f. Verdauungskr., May 24, 1913.

<sup>2</sup> Journal of the American Medical Association, 1913, vol. lx, p. 101.

autonomous nerve system are in relation to the absorption of poisons from the intestinal tract he offers an unusual excretion of indican (!) and glycuronic acid, the latter being excreted paired with indol. It almost makes one waver in his faith to hear such worth ascribed to such worthless things. When will this indol fetish die? Von Noorden states, much to our perturbation, that the high content of indican is enough to confirm his belief that the condition has its seat in the intestinal poisons.

Two papers on auto-intoxication must be referred to. The one is by Partlow<sup>1</sup> and the other by Bitzer.<sup>2</sup> The first is on the *relation of auto-intoxication to the psychoses*. The author writes, "In those individuals who possess the underlying predisposition, auto-intoxication is by far the most prolific and most prevalent exciting cause of psychoses, disturbing as it does the delicate mental balance in such persons, thus precipitating attacks." On seeking data upon which the author makes his diagnosis, we read of one case, "Physical examination negative, except very dry skin, parched tongue and oral mucosa, with an extremely offensive putrescent breath, stubborn constipation," and of another case, "Physical examination negative except torpid excretions, dry skin and mucous membranes, offensive breath, cold extremities, indicanuria, and a general picture of auto-intoxication."

The second paper under consideration is devoted to *local features of auto-intoxication*, and in it this sentence occurs, "When indican in abnormal quantities is found in the urine, the diagnosis is easy." This last sentence does not spell the truth, for I have seen cases of indicanuria when the diagnosis was far from easy. Not every case showing indicanuria is a case of auto-intoxication, and not every case of indicanuria shows auto-intoxication. I am ready to believe that auto-intoxication is a common condition, but I am by no means ready to believe that the diagnosis is "easy" and that it can be made on one test alone. Personally, I know of no one test or of no two tests which help at all in the solution of the question. Because indican and increased amounts of conjugate sulphates, phenol, and urobilin are found in psychic states, local affections, eye conditions, and what not, this is no firm reason why any or all of these substances are responsible for the symptoms of the above. *Post hoc ergo propter hoc* has been but too often the pit into which diagnosticians have blindly stepped.

The significance of indicanuria in practice and the relation of this diagnostic lodestone in eye diseases are given by Morgan<sup>3</sup> and Woods<sup>4</sup> respectively.

**Treatment of Intestinal Toxemia.** *Transduodenal lavage* is the name used by Jutte<sup>5</sup> to describe a treatment for intestinal toxemia, which

<sup>1</sup> Southern Medical Journal, 1912, p. 765.

<sup>2</sup> Ibid., p. 770.

<sup>3</sup> American Journal of the Medical Sciences, 1912, vol. cxliv, p. 827

<sup>4</sup> Ohio State Medical Journal, 1912, vol. viii, p. 345.

<sup>5</sup> Journal of the American Medical Association, 1913, vol. lx, p. 586

he finds to be a cause of a great many diseases. He does not review the literature, for his paper is a short one, but there can be no room for argument as to the great importance of intestinal toxemia in medicine, for even a glance at the current medical journals, he says, will indicate the great number of diseases, cases of which have been found to be due to the excessive absorption of putrefactive and fermentative products. Among the diseases called into being by intestinal toxemia, he classifies gastric and intestinal disorders, rheumatism, gout, sciatica, arthritis deformans, functional disorders of the heart, arteriosclerosis, epilepsy, asthma, Bright's disease, cirrhosis of the liver, neurosis, neuralgia, neuritis, primary and secondary anemia, skin diseases, catarrhal inflammation of the mucous membranes, eye diseases, insomnia, neurasthenia, melancholia, dementia, and insanity. "Considering that so many diseases have been caused by absorption of toxins," Dr. Jutte writes, "It will not be surprising that by flushing out the toxins I have had such uniformly good results as those mentioned in the above case reports and in the case of asthma and pernicious anemia," which he has previously reported.

Having introduced a duodenal tube, it is attached to an irrigator or rubber bag containing about 2000 c.c. of fluid. The patient turns on his back, and from 1000 to 1250 c.c. of fluid are allowed to trickle into the bowel. After this (lasting about ten minutes) the tube is gently withdrawn and the patient rests a while. I quote from Jutte as to the indications for the various fluids: "In nervous disorders, general malaise, anemia, rheumatism, indicanuria, in short, whenever it is desirable to cleanse the bowels thoroughly, I use normal saline (9 gm. to 1000 c.c.) at body temperature. To flush out the kidneys, plain distilled water gives a very copious diuresis. In icterus, and when fat digestion is impaired, the addition of 0.5 gram pure Castile soap to 1000 c.c. of saline is beneficial. Of late I have restricted the use of soap to these conditions, as it seems to cause a slight nausea or headache at times. To withdraw fluid from the body a stronger solution than normal saline will be found to do the work. I believe that the addition of stringents to the saline, in catarrhal enteritis, and of quinine in amebic dysentery will be found beneficial, though I do not speak from experience in these ailments."

Is it not a pertinent question to ask, on what one bases a diagnosis of intestinal toxemia? Last year I assailed the popular conception of auto-intoxication in no equivocal fashion, claiming that the diagnosis was no easy matter, and could not be made on the presence of indicanuria. Jutte regards this indican as a most important sign, and seems to consider it an indication for lavage, regardless of symptoms. Thus, a man, aged sixty years, whose only blemish was indicanuria and albuminuria, was given lavage, with prompt disappearance of both, which end-result was held to be a cure, though of what, we are not told, as

no symptoms were complained of. Evidently there was an intestinal toxemia as "the removal of intestinal toxemia is the only explanation of the good effects" (of the transduodenal lavage). "This supports the modern views of the etiology of many chronic diseases."

**Intestinal Obstruction.** A study of 181 cases of intestinal obstruction has been made by McGlannan<sup>1</sup> and the paper is worthy of abstract. The reason why an abstract is not given is because of the wealth of information which it contains and which precludes any but a lengthy analysis. I recommend the reader, if he be interested, to consult the original paper, which presents a very capable study of these 181 cases.

**CAUSE OF DEATH IN OBSTRUCTION.** The study of this question (although a large amount of work has already been done) is far from being completed. The main issue seems to be whether the toxin is bacterial in origin or whether it is in the nature of a ferment action. Whipple and his co-workers<sup>2</sup> have pursued this study, using a closed duodenal loop which simulates a volvulus, and thus does away with vascular disturbances and food products which have confused the picture of other researches. They believe that the intestinal epithelium is necessary for the production of this toxic substance, and that dogs can be immunized against the poison.

When such loops, as are described in the article, are made in dogs, the animals die with symptoms similar to those exhibited by patients suffering from volvulus or high intestinal obstruction. The protective function of the liver is not called into play, as dogs with an Eck fistula may live three days with a closed loop. If the material from the closed loop be injected intravenously, it causes a profound drop in blood-pressure, general collapse, fall in temperature, salivation, vomiting, and blood-stained diarrhea. The inference seems to be justified that there is a poisonous substance formed in a closed duodenal loop which, being obstructed, caused intoxication and death.

A study<sup>3</sup> of the nature of this toxic substance shows that the toxin is not produced when the mucosa of the intestine is destroyed by chemical means. The blood taken from a dog with a duodenal loop is not toxic to a normal dog when given intravenously, and the normal mucosa does not contain the poison. The authors believe that the poison is formed by the injured mucosa and is in great part absorbed directly from it by the blood.

How this toxin is formed seems to be still an open question, although it is not unlikely that the enormous growth of bacteria is an important stimulus to the perverted activity of the intestinal mucosa. Absence of the secretions from the stomach may also be a factor. "Until we have a better understanding of this phenomenon it may be permissible

<sup>1</sup> Journal of the American Medical Association, 1913, vol. lx, p. 733.

<sup>2</sup> Journal of Experimental Medicine, 1913, vol. xvii, p. 286.

<sup>3</sup> Ibid., p. 307.

to speak of the mucosa being upset or developing a perverted activity with formation of a toxic substance which may be absorbed directly into the blood."

**CHRONIC INTESTINAL OBSTRUCTION.** In Pfahler's paper<sup>1</sup> which has to do with the diagnosis of constriction of the bowel, is the description of a rather unusual case of chronic intestinal obstruction. This is a condition occurring in connection with a large sigmoid loop. When this loop becomes distended with gas, it displaces the stomach, presses on the transverse colon, stops the contents of that part of the gut, may obstruct the descending colon or both the transverse and descending portions, or may become twisted in itself. Individuals possessing such a redundant sigmoid suffer periodically from headaches, nausea, and vomiting, with abdominal distress and a feeling of distention. The predisposing cause of these attacks is the eating of gas-producing foods.

**INTESTINAL OBSTRUCTION DUE TO GALL-STONES.** Last year (p. 111), I called attention to the infrequency of gall-stone ileus, and quoted some references to support this. This condition is so rarely encountered presumably, that individual cases are deemed worthy of report. Moller<sup>2</sup> has had a vast experience, publishing an analysis of 22 cases in which he has operated. In a number of the cases there had been no previous symptoms of cholelithiasis. Typical colic had occurred in 6 cases, and vague symptoms in five, but 50 per cent. of the total. The diagnosis is not a simple one then, and Moller claims even when the abdomen is open the diagnosis is difficult, and, in a number of cases, the conditions first found were held to be sufficient to explain the ileus and no further search being made for a gall-stone, the true nature of the ileus escaped detection. This may account for the fact, that up to 1910, only 250 cases had been reported.

**Myoma of the Intestine.** An instance of this rare condition, the diagnosis of which could be made only at autopsy, is contributed by Rosenow.<sup>3</sup> The patient was a forty-three-year old man, who, a year before admission to the hospital, had suddenly become very pale. The physical examination revealed nothing, and, apart from the anemia, the only important laboratory examination was the presence of occult blood in the feces. Proper diet and bismuth were followed by so great an improvement that the patient was able to go to work again. He suddenly succumbed nine months later. During his entire illness he had never been nauseated, and had never vomited, and had never had any pain. Inasmuch as there was no blood in the gastric contents, and as blood was found in the feces, the clinical diagnosis of duodenal ulcer seemed the most probable. The accompanying cut shows the true conditions. The myoma, for such it was later shown to be, was situated

<sup>1</sup> Journal of the American Medical Association, 1912, vol. lix, p. 1770.

<sup>2</sup> Ibid., 1913, vol. lx, p. 1589; abstract.

<sup>3</sup> Deutsch. med. Woch., 1912, p. 1785.

within  $1\frac{1}{2}$  cm. of the pylorus, and for the greatest part of its bulk was outside the lumen of the bowel. The cause of the bleeding was numerous erosions of the surface of the tumor. Rosenow reviews in brief the bibliography of this unusual pathological curiosity.

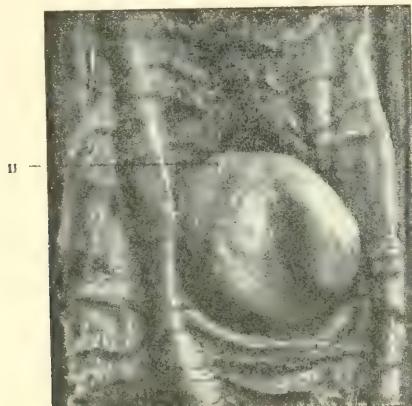


FIG. 15

**Adenoma of the Small Intestine.** Hartmann<sup>1</sup> reports two cases of polyp of the small intestine, one of the duodenum, and the other of the jejunum, both giving rise to gastric stasis and both leading to the diagnosis of pyloric stenosis following gastric ulcer. The condition is undoubtedly a rare one, and there seems to be no symptomatology which would lead one to suspect the existence of such tumors. The latter must be regarded as medical curiosities but should nevertheless be thought of in cases of pyloric obstruction.

**Gout of the Intestine.** It may be of interest to the reader to have his attention called to an article by Haig<sup>2</sup> in which the latter assumes that gout explains "nasal and pharyngeal catarrh, catarrh of the neighboring larynx and trachea, catarrh of the esophagus, of the stomach, gastroduodenal catarrh and jaundice, ulceration of the stomach and duodenum, colitis, appendicitis and some forms of piles." "This causation also explains completely the evidence of cancer of these same parts, as it is now seen to affect exactly the same parts as gout does and in the same order. This fact therefore clinches (?) the relationship between gout and cancer (sic!) and shows that if cancer is due to parasitic invasion its parasite is, like that of catarrh, influenza, tubercle and malaria, unable to attack those individuals or those parts of the body which are free from the gout poison—uric acid."

**Acute and Chronic Mucous Colitis.** These are two borderline conditions of interest alike to the physician and to the surgeon, but the

<sup>1</sup> Presse Méd., 1913, p. 241.

<sup>2</sup> Medical Record, 1912, vol. lxxxii, p. 645.

internist seems to have withdrawn from the field, leaving the subject in the hands of the latter. It is no doubt true in most cases that mucous colitis is a symptom and not a disease, and that a further cause must be sought for.

**ACUTE COLITIS.** Sonnenburg<sup>1</sup> contributes a notable monograph on the subject, in which, however, the reader is confused by the interchange of the terms colitis and pericolitis. Sonnenburg elects to divide colitis into acute sigmoiditis, acute colitis of the splenic and hepatic flexures and typhlocolitis, all of which fall under the common heading, circumscript colitis. The symptomatology, differential diagnosis, and treatment are all judged of from the surgeon's point of view, and it is of much interest to read this paper in connection with the article of Albu.<sup>2</sup> The latter describes a case, which appears to me to be one of true colitis. The patient was a married woman, aged twenty-one years, who had complained for five weeks of frequent bowel movements (3 to 6 passages a day). These stools contained no fecal material except the passage in the morning, and after that only more or less blood, with much mucus and pus. Pain was never complained of, but, on account of the long-continued loss of blood, the patient's health was becoming affected. Of importance in the physical examination was a moderate amount of tenderness on pressure in the left hypochondrium. Rectal examination revealed nothing of importance save blood on the examining finger, and the stool examination showed red-blood cells and pus cells enmeshed in a mucous ground-work. Sigmoidoscopy disclosed, about 10 cm. *ab ano*, much reddening and swelling of the mucous membrane, and in some places the latter was covered with fresh and coagulated blood. After careful cleansing of the part, the mucous membrane could be seen to have a sieve-like, ulcerated appearance 23 cm. *ab ano*, the mucous membrane was very red and much more ulcerated, and in some places necrosis was seen.

In discussing the etiology of this condition, Albu concludes that it must have been due to a vulgar infection from the intestine, either with *B. coli*. or staphylo- or streptococci. He excludes tuberculosis on the ground that there is nothing in the physical examination or history to suggest such a disease, and on the failure to find tubercle bacilli in the bowel movements. Gonorrhea and syphilis were likewise excluded in the absence of gonococci and in the absence of a positive Wassermann reaction. Dysentery was ruled out on account of no fever and no general symptoms, and also because no dysentery organisms were found. A marked eosinophilia was noted but this was interpreted as meaning an infectious enteritis, following the teaching of Werzberg. The condition is a most serious one and in many cases leads to death.

<sup>1</sup> Mitt. a. d. Grenzgeb., 1912, val. xxiv, p. 228.

<sup>2</sup> Deutsch. med. Woch., 1912, p. 1787.

**CHRONIC COLITIS.** Rosenheim<sup>1</sup> urges the importance of studying and treating most conscientiously any intestinal catarrh, be it ever so mild, as the transition is insidious from a slight affection to the degree of severity typified in the cases which he calls "colitis chronica gravis." This form of chronic colitis appears usually in the second and third decades of life, generally in nervous individuals. The prognosis is always guarded, and as far as treatment is concerned, medical measures should be given a fair trial before recourse is had to surgical interference. Conto<sup>2</sup> calls attention to the significance of intermittent fever in mucous colitis, claiming that it is a phenomenon to which too little attention has been directed. Conto, a professor in a South American city, seems certain that malaria can be excluded in his cases, although the fever appeared at a stated time in the day, and the patient during these times had an indefinite feeling of ill-health.

The old idea, that of retention of bismuth in an ulcerated area, is used by Stierlin<sup>3</sup> for recognizing colitis. This method, when applied to cases of gastric ulcer, has failed to fulfil all the expectations aroused by its inventor, and one can only reason by analogy that the method seems to promise little in similar, though much more complicated, intestinal conditions. The procedure, in brief, consists in giving a bismuth meal, which is held in the excavated ulcers long after the greater portion of the bismuth has left that portion of the intestine.

The frequency of the *association of movable kidney and chronic colitis* has led most observers to believe that in *ren mobilis* there is an etiological factor for the colitis. Liddell<sup>4</sup> believes, however, that the colitis is the primary condition, and that through the auto-intoxication there results absorption of the perirenal structures permitting of the descent of the kidney.

As far as the treatment<sup>5</sup> is concerned, although the prognosis is serious *quoad sanationem completam*, something may be accomplished by the internist. As the disease can be divided into two stages, the acute febrile, and the chronic treatment must be likewise thus divided. For the acute attack, calomel is indicated, 0.03 gm. twelve times a day for three days, and after this time bismuth salicylate in small doses every hour, until the stools are formed. The diet should consist of liquid food, and only when the condition has improved should more solid food be taken.

In the chronic stage, Wegele recommends irrigations, but does not approve of dusting powders introduced through the rectoscope, on account of the local trauma incident to the introduction of the instrument, and because the dusting powder does not reach the ulcerated

<sup>1</sup> Deutsch. med. Woch., 1913, p. 989.

<sup>2</sup> Ibid., p. 751.

<sup>3</sup> Zeitschr. f. klin. Med., 1912, vol. lxxv, p. 486.

<sup>4</sup> Lancet, 1912, vol. ii, p. 817.

<sup>5</sup> Wegele, Med. Klin, 1913, p. 89.

surfaces in the higher parts of the intestine. For cleansing purposes, a chamomile injection is used, and, following this, the medical irrigation. Of these, Wegele uses 1 per cent. ichthyl; when there is much pus a collargol solution (50 c.c. of a 1 per cent. solution to 150 c.c. warm water); when there is much hemorrhage, a gelatin or calcium chloride gelatin injection (Merck), or a 1 per cent. hydrogen peroxide solution. It is imperative to remove the latter in a short time, through the soft rectal tube, as the formation of gas causes great pain. When the ulceration is extensive, iodoform may be used<sup>1</sup> or a suspension of dermatol (dermatol 25.0, aq. dest. 400.0, mucilage of acacia and glycerin  $\ddot{\text{a}}\ddot{\text{a}}$  500. Use 100 grams with 50 grams warm water and inject with syringe and soft rectal tube). Wegele discourages the use of narcotics except at night when it is necessary that the patient should have sleep.

The diet is of great importance, and all irritating food is to be avoided.

So far as operative treatment is concerned, the results so far have been unconvincing, and Wegele believes operation should not be recommended until all medical measures have been without avail.

**Megacolon (Hirschsprung's Disease).** In 1886, Hirschsprung reported four cases of obstipation, which he believed to be due to congenital idiopathic dilatation of the colon. Since this time the condition has been the theme for much discussion although forty years before, an Italian, Favalli, had published an account of a case and Porro had operated for the same trouble. Hirschsprung's description of this anomaly, collection of gas and fecal material in the abdomen, dilatation of the intestine, and hypertrophy of the intestinal wall was the first to define the clinical picture. His original assumption that it was a congenital dilatation and hypertrophy has been more or less discredited, and the belief is, that in the majority of cases, the colonic features are but the result of an obstruction somewhere in the large intestine, this obstruction being present at birth or acquired during life. A summary of these various obstructions is given by Meyer.<sup>2</sup>

1. An abnormal length with a loop formation of the large intestine, especially of the sigmoid flexure, thereby leading to a volvulus, so to speak, of this flexure.

2. A valve-like closure of the bowel due to abnormal development of the valvulae conniventes in the upper part of the rectum.

3. Local spasm in the lowest part of the intestine.

4. Imperfect or weak innervation of the intestines.

The diagnosis is difficult to make *intra vitam*, and the true state of affairs is usually recognized first at autopsy or at operation. Frank<sup>3</sup> recommends taking a photograph of the intestine after inflation of the

<sup>1</sup> Ohly, Deutsch. med. Woch., 1912, No. 43.

<sup>2</sup> Deutsch. med. Woch., 1913, p. 416.

<sup>3</sup> Mitt. a. d. Grenzgeb., 1913, vol. xxvi, p. 39.

same *per rectum*, which procedure, he claims, gives more brilliant results than the picture made with bismuth.

The treatment of the condition is essentially operative, though Meyer shows what may be done with proper feeding when the case is seen early. The prognosis, according to Fago,<sup>1</sup> is serious, the mortality being 57.7 per cent. and probably much higher. In the cases not operated on, the death-rate was 75.8 per cent., and in the 44 operative cases the mortality was 38.8 per cent. Megacolon is liable to prove fatal from auto-intoxication from inflammatory processes in the colon, from peritonitis, from ileus, and from cachexia.

Luria<sup>2</sup> believes, with Heller, that children who do not succumb to Hirschsprung's disease in early life become candidates for a condition of megasigmoid, and as the possessors of this anomaly they are in constant danger of ileus. We are cautioned to keep before us the possibility of a megasigmoid in our examination of the lower bowel, in patients complaining of chronic and obstinate constipation. Once being recognized, surgical aid should be invoked.

**Atony of the Cecum.** According to Stern<sup>3</sup> typhlatonia, is generally due to adhesions and is generally associated with dilatation of the part. Its symptomatology may be briefly summarized: Ordinarily the disease occurs in young individuals of either sex, but may occur between the twenty-fifth and forty-fifth years, and perhaps later. The patient suffers with paroxysms of severe gripping pain which last for several hours, but in some individuals definite paroxysms are not encountered, only a certain amount of discomfort. Between the attacks of pain, obstinate constipation is a characteristic feature of the affection. During the paroxysm there is loss of appetite, nausea and vomiting, and marked symptoms of collapse. Despite this, there is no temperature elevation, the pulse rate and leukocyte count remain normal. Upon examination there is a localized resistance or even a circumscribed tumefaction in the cecal region. The area is never firm, but soft and somewhat elastic, and Stern describes the feel as that of a moderately inflated toy balloon.

The condition should never be mistaken for acute appendicitis, but is commonly being confused with chronic appendicitis. Of importance in this connection is the ileocecal gurgling and, sometimes, cecal splashing, which are found in cases of atonically dilated cecum. Treatment is usually surgical.

**Cecum Mobile.** There have been but few papers devoted to the question of movable cecum during the past year and this is rather remarkable, as last year there was a great *furor scribendi* on this subject. On account of its newness, I devoted much space last year to its consideration (page 115), but this year there has been so little written on the

<sup>1</sup> Abstract, Journal of the American Medical Association, 1913, vol. lx, p. 1271.

<sup>2</sup> Deutsch. med Woch., 1912, p. 1416.

<sup>3</sup> Archives of Diagnosis, 1913, vol. vi p. 9.

subject that it seems scarcely worth while to discuss it at all. Bevan,<sup>1</sup> in his address before the Surgical Section of the American Medical Association, says, "As to Wilm's movable cecum, it will be interesting for you to read, if you have not done so, Wilm's original article, and you will find that there is no further basis for movable cecum than the fact that it occurred to Wilm as an idea which might explain the failures to cure some cases which he had operated on for chronic appendicitis. Many of the patients were neurotic (38 per cent.), and he noted that in some of the failures to cure, the operation had been very easy technically, the appendix easily brought into view at the end of a very movable cecum and easily brought out of the wound. In thinking over the subject, it occurred to him that the very movability of the cecum might be the cause of the symptoms, and he decided to anchor it in place and see the result. He then, for a considerable series of cases, with symptoms of chronic appendicitis, not only removed the appendix but anchored the cecum, and reported most perfect cures, just as our gynecological brethren do after anchoring the uterus by some special method, as our own surgical colleagues do in reporting some special operation for movable kidney.

"As a matter of fact there is no reason to suppose that the mere movability of the cecum can, of itself alone, give rise to trouble, any more than can a normal ileum or normal sigmoid, both of which are much more movable than the so-called mobile cecum." Bevan then proceeds to sweep from the boards Wilm's views and Wilm's operation, which, he says, has been of great detriment to patients. I would refer the reader to my review of last year for a full discussion of the subject.

**Sigma Mobile.** Not being content with a cecum mobile, Kienböck<sup>2</sup> must needs instruct us as to the symptomatology of a movable sigmoid. The symptoms of the patient in his paper were constipation and pain in the cecal region. X-ray examination showed that the sigmoid had become so elongated that it reached the right side of the abdomen and occupied the right iliac fossa, and he recommends that such an anomaly be kept in mind as an explanation of pain in that region.

**X-ray of the Appendix.** The discussion as to whether the normal appendix can be seen with the *x*-ray is again rife, the French school claiming it can be detected, and the German school holding the opposite opinion. Groedel<sup>3</sup> leaves nothing to be desired in his emphatic reiteration that in a normal man the appendix is never visible, a statement which has drawn the fire of Cohn<sup>4</sup> followed by a caustic reply from Groedel. Whatever the true state of affairs may be, it is apparent that, when the appendix is seen, it is regarded as a curiosity, as practically no book on *skiagraphy* gives the question any consideration.

<sup>1</sup> Journal of the American Medical Association, 1912, vol. lix, p. 112.

<sup>2</sup> Münch. med. Woch., 1913, p. 68.

<sup>3</sup> Ibid., p. 744.

<sup>4</sup> Ibid., p. 1042.

**Appendicitis.** A timely and thoroughly entertaining article on *chronic appendicitis* has been written in happy vein by Krecke.<sup>1</sup> He arrays on the one side those physicians who explain all inexplicable abdominal pain on the basis of chronic appendiceal inflammation, and on the other he marshals those specialists who deny the existence of a chronic appendicitis, and who, according to their lights, their experience, and their individual preference, interpret such pain as being due to constipation, intestinal atony, colitis, splanchnoptosis, cecum mobile, typhlatonia, neurasthenia, and hysteria, and never speak of cholelithiasis ren mobilis, nephrolithiasis, ulcus ventriculi, oöphoritis, and perimetritis. Such a state of diagnostic affairs makes the practising physician giddy at what has gone before, and makes him hopelessly uneasy at the future, judging from the load of literature he is being forced to read. There can be no doubt, however, that attacks of abdominal pain, localizing themselves in the right iliac fossa, are becoming more frequent, and Krecke believes this is due to a form of autosuggestion, in other words, an "appendiceal neurasthenia." This belief is based on the well-known fact that many patients are operated upon for appendicitis, when examination later shows the appendix to have been normal.

Krecke distinguishes two forms of chronic appendicitis. The first is chronic from the beginning, with no acute attack, no rise of temperature, and with symptoms pointing to disturbance in the right iliac fossa. The second form, follows one or more acute attacks. From a pathological standpoint, this is scarcely sound, as Aschoff has taught us that every case of chronic appendicitis *sensu strictiori*, begins with an acute attack. As true as this undoubtedly is, there are many cases of chronic appendicitis, who absolutely deny any previous acute inflammation of that structure. On the other hand, operations, undertaken in the interval between acute attacks, have revealed the fact that the appendix shows no signs of inflammation, and Krecke assumes with Aschoff that the appendix, between acute exacerbations, can present an absolutely healed appearance. Can such cases be those which we are at present diagnosing "appendiceal colic" for want of a better term?

Krecke, a surgeon in Munich, has made careful clinical and pathological studies of the appendix cases operated on by him, and concludes that a chronic appendicitis with acute exacerbations can be associated with a normal gross and microscopic appearance of that structure, while the chronic form, without acute attacks, often show a markedly diseased appendix. An appendix, when apparently normal macroscopically, may show marked inflammatory signs on microscopic examination. In cases in which the appendix presents no lesions, an appendectomy often causes an abatement of symptoms. (Is this a type of his neurasthenic appendicitis or appendiceal colic?) Krecke advises us to study the psychic state of a patient complaining of appendicitis,

<sup>1</sup> Münch. med. Woch., 1913, p. 572.

and warns us not to make a diagnosis on one examination alone. When the diagnosis is once established, operation should not be delayed.

The difficulty of diagnosing true chronic appendicitis, in the absence of a history of acute attacks, seems to be moderated somewhat by the value which Bastedo's sign possesses. This phenomenon, consisting of the production of pain and tenderness in the right iliac fossa on inflation of the colon with air, was described in 1909 by Bastedo, of New York. Since then it has been praised by Continental writers, and the latest writer is Hertz.<sup>1</sup> The technique consists of inserting an ordinary rubber rectal flatus tube into the rectum for a distance of six inches, and connecting the tube with a pump. After the tube has been inserted, the patient lies flat on his back, and the pump is brought up between his legs. The air is slowly pumped in, and, in normal individuals, after a certain amount has been introduced, there will be felt a diffuse discomfort in the lower abdomen, but no pain. In cases of appendicitis, pain will be complained of, the distress being localized in the right iliac fossa, even if previously the trouble has been in the epigastrium. This test is similar to that known as Rovsing's sign, in which pain is felt in the appendiceal region by exerting pressure over the descending colon. I have employed the Rovsing test without satisfactory results, probably due to the fact, as Hertz suggests, that there is not enough air in the large bowel to cause a sudden change of pressure sufficient to push the air against the diseased ileo-cecal valve. It is much more reasonable to hope for better results with Bastedo's method, although it should not, of course, be used in cases of acutely inflamed appendices unless operation can be immediately performed, as there is too much danger of rupturing the bowel.

To make more sure of the pre-operative diagnosis of acute appendicitis a method of dorsal examination is described by Ewart.<sup>2</sup> In health, there are two "posterior iliac patches" of subresonant dulness, the right patch being slightly duller than the left, presumably owing to the airlessness and thickness of the appendix.

The patient should be examined in a standing position, and should lean forward, resting both hands on a table. The iliac crests are marked with a dermatographic pencil, beginning from below where the crest of the tuberosity is easily felt. Percussion is then made for the outline of the normal patch on both sides, starting preferably with the left patch, which is less dull than the right one. The standing examination is applicable only to ambulant cases, and in more severe cases, the examination must be made in bed with the patient sitting up. In cases of appendicitis, even without abscess formation, there is an increase of dulness in the right flank which the author says may be sharply outlined. If there is any value in this method, and Ewart

<sup>1</sup> Lancet, 1913, vol. i, p. 816.

<sup>2</sup> British Medical Journal, 1912, vol. ii, p. 1741.

claims for it much worth, the procedure should not be neglected, as the diagnosis of appendicitis is a most difficult one at times. One might be able, by employing Ewart's method, to distinguish between

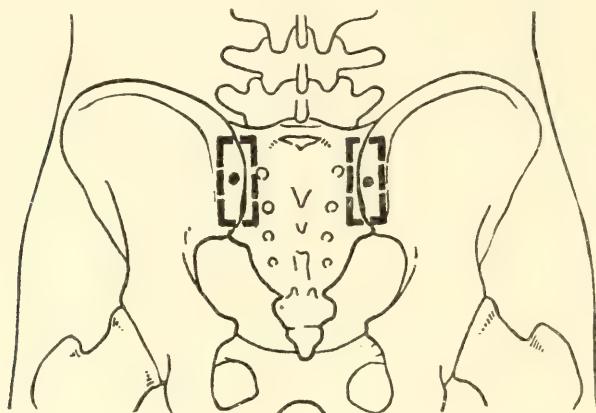


FIG. 16

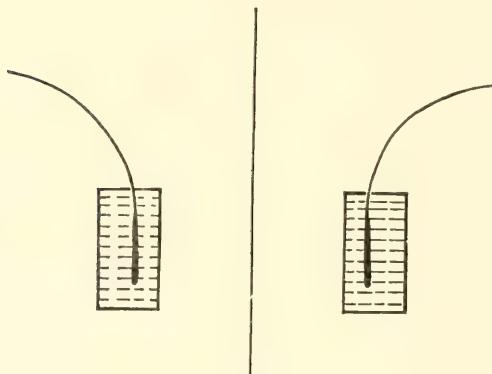


FIG. 17

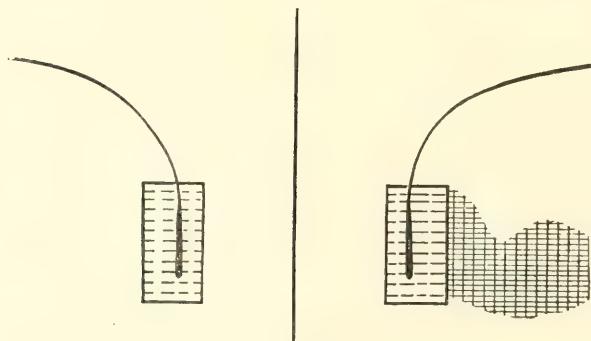


FIG. 18

true appendicitis and those forms which Krecke believes are of a neurasthenic type.

The epigastric pain which is so often encountered in cases of chronic appendicitis, and which has frequently led to the absurd diagnosis of "dyspepsia," is now recognized as being purely a reflex pain discharged through the vagus and caused by an inflammatory or mechanical irritation of the nerve ending of the appendix.<sup>1</sup>

**Diverticulitis.** This condition, which, strictly speaking, is a surgical one, has some significance for the internist, inasmuch as it is by no means a rare disease, according to Stanton.<sup>2</sup> The etiology of diverticula is uncertain, but the fact that about 25 per cent. show malignancy at the time of operation should make one keen for an early diagnosis. Diverticula occur generally in fleshy people, during and past middle life, and are more frequent in males than in females. They may be single or multiple, and are most commonly found along the mesenteric border of the large intestine, particularly on the sigmoid.

The symptoms of diverticulitis are described as those of a left-sided appendicitis. As stated by Stanton, the onset is sudden, with more or less general pain, later becoming localized in the left side, being cramp-like in character. Vomiting is rare, tenderness develops early, the temperature is raised, and a tumor mass is soon found to the left of the umbilicus, or in the left lower quadrant of the abdomen.

As far as *treatment* is concerned, this varies according to the age of the person and the conditions present. If the patient is old and the attacks are slight, it is better not to interfere. If an abscess is present, operation is indicated.

**DIVERTICULITIS OF THE LARGE BOWEL.** A clinical review of 27 cases of diverticulitis from the Mayo clinic has been published by Giffin.<sup>3</sup> Of these cases, 22 were in the sigmoid, 2 in the rectum, 1 in the transverse colon near the hepatic flexure, and one at the anal ring. The following are to be reckoned as valuable diagnostic signs in a patient with a tumor of the sigmoid: (1) Absence of definite symptoms of malignancy. (2) General good health with tendency to obesity. (3) Long history of localized pain in the left lower abdominal quadrant. (4) History of a mass which subsequently disappears. (5) Absence of persistent macroscopic blood in the stools. (6) Inflammatory vesical fistulas on cystoscopic examination. (7) Negative sigmoidoscopic examination as regards malignancy.

There is a tendency in this condition to carcinomatous degeneration, as 5 of the 22 were thus afflicted. Of the signs of carcinoma it seems unnecessary to speak, as they are familiar to all. Operative treatment is the only treatment, and, in view of the high percentage of carcinoma, early operation seems imperative.

<sup>1</sup> Solieri, Mitt. a. d. Grenzgeb., 1912, vol. xxv, p. 240.

<sup>2</sup> Boston Medical and Surgical Journal, 1913, vol. clxviii, p. 343.

<sup>3</sup> Journal of the American Medical Association, 1912, vol. lix, p. 864.

**Carcinoma of the Colon.** The internist is not so much concerned with the treatment of carcinoma of the colon as he is with its early diagnosis, for we are being constantly told by surgeons that they see these cases just when the stage of complete obstruction is well marked. If this is so, it well behooves us to listen to their teaching and by following them to be able to recognize the condition at an early date, thereby assisting the surgeon in his sphere, namely, operative treatment. The last named hardly concerns us, hence we pass reluctantly to an able article by Cumming<sup>1</sup> and scrutinize that of Cope,<sup>2</sup> another surgeon. Carcinoma of the colon cannot be a rare disease, for it occurs in about one of every 200 surgical cases, but its symptoms seem to be most protean.

There is no constant order of symptoms, for any one of the following, constipation, diarrhea, vomiting, pain, tumor, distention of the abdomen, may announce the condition. Cope calls attention to the fact that the malady may be latent and practically symptomless, until an attack of acute or subacute obstruction rivets the attention of the subject, and forces him to seek medical advice. Slight symptoms of any bowel trouble should be carefully noted and the cause of each assiduously ferreted out. The symptoms may be classified under six headings, though these headings are purely arbitrary, and not every symptom fits in each category as given below.

1. *Symptoms Due to Bowel Obstruction.* Of these, pain, constipation, distention, nausea, vomiting, and visible peristalsis are the commonest. The pain is colicky in character and is due to contraction of the intestine above the constriction, usually bearing no relation to the taking of food. All the symptoms may be so mild that they pass muster for an ordinary attack of biliousness, a term, by the way, which has a fascinating facile adaptability to undetermined corporeal indispositions.

2. *Symptoms Due to Bowel Ulcerations.* Diarrhea, passage of blood and mucus result from ulceration of the bowel, but, as a rule, visible bleeding is rare, and one should make use more often of the test for occult blood. Cope warns against the diagnosis of mucous colitis *per se*, for he believes the passage of pieces of mucus is merely a symptom of a more serious condition. The occurrence of diarrhea often misleads the patient into believing that the bowels are regular, whereas the looseness may be the so-called diarrhea of constipation.

3. *The Presence of a Tumor.* A tumor is frequently felt, but just how early is not stated; no doubt the surgeon might tell us, due to the failure to refer such cases to him. It does occur early, however, for we are told that in the early stages the tumor is often mobile, especially when in a part having a long mesentery, as the transverse or pelvic colon. When the tumor ceases to be mobile, pericolitis has supervened.

<sup>1</sup> British Medical Journal, 1913, vol. i, p. 328.

<sup>2</sup> Ibid., 1912, vol. ii, p. 753.

4. *Symptoms Due to Extension to Other Viscera.* These vary according to the organ invaded, and no viscus is apparently spared, although serious extension to other structures is uncommon.

5. *Symptoms Due to Pericolitis and Peritoneal Infection.*

6. *General Symptoms.* These are absent at first and the patient looks robust. Later, as the tumor grows, the typical symptoms of any cancerous neoplasm appear.

It is evident, then, that the internist must recognize and interpret properly the symptoms due to bowel obstruction, if the long-desired timely intervention of the surgeon is to be invoked. I should be inclined to rearrange Cope's symptomatology in a slight degree, placing occult blood among the earliest symptoms. My experience has been that the test for this hidden, microscopic bleeding is an extremely valuable sign of carcinoma of the gastro-intestinal tract, and is not dependent on an advanced growth or a late stage of the tumor. Bowel irregularity in a person past middle life should receive as much consideration as a gastric disturbance, and the verdict "Cancer, until proved otherwise" is not too drastic in such cases. A careful physical examination should never be omitted, and rectal examination, too often neglected by those who most urge them, should be made frequently. Should the finger detect nothing, then resort should be had to sigmoidoscopy. The x-ray is, of course, invaluable, but with all these modern improvements of diagnostic equipment, many cases escape detection until an unfortunately tardy operation reveals the true nature of the disease.

**Carcinoma of the Rectum.** This condition is essentially surgical, and I call attention to it here only for the purpose of quoting from Miles'<sup>1</sup> paper: "It is of the utmost importance that the earliest symptoms indicative of the presence of a malignant tumor in the rectum should be known and recognized. The disease is insidious in its inception and early progress, and may exist for six months or longer before giving rise to symptoms which may induce the patient to seek advice." Strangely reminiscent of the tone of the previous two papers is the warning of Miles, and, although hardly leveled at the internist, it is but a further proof, to my mind, of the urgent necessity of making rectal examinations a routine procedure.

**Early Diagnosis of Tuberculosis of the Intestine.** Primary tuberculosis of the intestine is so rare that it is regarded almost as a curiosity, occurring in only 2.27 per cent. of 2058 autopsy studies by Zahn. Tuberculosis of the bowel secondary to pulmonary tuberculosis is relatively frequent, ulceration being found in 63 per cent. of cases of tuberculosis. Generally considered, this secondary form is thought to be a late complication of pulmonary tuberculosis, occurring so late in the latter that therapeutic intervention is ineffectual. The symptoms are generally persistent diarrhea with more or less abundant passages, containing blood at

<sup>1</sup> British Medical Journal, 1913, vol. i, p. 166.

times. There is abdominal pain, the appetite is poor, and the proper feeding of the patient becomes a matter of the greatest difficulty. Jaquerod<sup>1</sup> says, when diagnosed at this late stage, treatment is hopeless, but there must be an earlier period during which the ulcerations are developing, and it is this stage which he attempts to diagnose.

Intestinal tuberculosis can appear at all stages of phthisis, in the first as well as in the third, in those with only a slight catarrh as in those with cavity formation. Of 20 cases of secondary intestinal tuberculosis, the first signs have appeared as follows: twice in the first stage, fourteen times in the second stage, and five times in the third. The early symptoms are different from those of the late stages.

**GASTRIC SYMPTOMS.** The first signs are a disturbed appetite which interferes with the taking of food. As a rule, tuberculous cases are good eaters, and forced feeding is often given without much difficulty. Owing to the inability to give the proper amount of food, the patient loses weight, and this is the first sign of intestinal invasion. When a patient who has heretofore eaten well, begins to lose his appetite, becomes capricious in the choice of his food, has pain in the epigastrium, eructations of gas and sometimes vomiting, one should be on the lookout for intestinal involvement. The above-mentioned symptoms occur at times in most tuberculous patients, but they are not persistent. Jacquerod quotes two anatomists who have shown that in cases with intestinal tuberculosis, the stomach always shows some lesions, whereas in the pure pulmonary cases, this organ is normal.

**INTESTINAL SYMPTOMS.** At the beginning, tuberculous enteritis does not cause intestinal symptoms. Diarrhea is rare, constipation being more often the rule. Usually there is a normal stool for a few days, then follows a voluminous, fetid passage. The examination of the feces produces but little of diagnostic aid. The presence of tubercle bacilli is of little value, unless the bacilli are found in the stools of one who is particularly careful to avoid swallowing the sputum. Rarely there is spontaneous pain; when the latter is complained of, the disease may be considered to be advanced. Pain on pressure of the abdomen is generally found, but this is not diagnostic, as pain is often elicited in those who have no tuberculosis.

**FEBRILE SYMPTOMS.** In uncomplicated pulmonary tuberculosis the temperature is low in the morning, the fever commences in the afternoon, reaching its maximum between four and seven, returning to normal about nine o'clock. In intestinal tuberculosis, the elevations of temperature have no regularity. In the morning the temperature is often subnormal, and after each meal there is an elevation, between 4 and 7 P.M. it is normal, and sometimes for days there will be no fever.

<sup>1</sup> Rev. Méd. de la Suisse Romande, 1912, vol. xxxii, p. 380.

**TREATMENT.** Acute tuberculous enteritis shows a tendency to localize itself, but chronic enteritis never, and from the very start it progresses continuously. Jacquierod believes that no medicine can cure it, nor can light therapy, lavage, tuberculin, or serotherapy. He recommends surgical treatment. Since in a great number of cases the enteritis begins in the cecal region (of 219 cases, 133 had appendiceal involvement), he advises resection of the cecum if the case can be diagnosed early.

**Hysterical Paralysis of the Bowel.** Illoway<sup>1</sup> reports such an instance in a woman who had had no bowel movement for fifteen days. After using many remedies, a satisfactory movement was obtained with three liters of warm water with 45 c.c. of castor oil, 45 c.c. of emulsion asafetida, and 30 drops of spirit of turpentine.



FIG. 19

**Fermentative Dyspepsia (Gärungsdyspepsie).** This is a term which sounds rather crude in these days of ultrascientific nomenclature. The subjective symptoms nevertheless appear to be pain in the abdomen, distention of the latter with gas, borborygmi, diarrheic movements with flatus and diarrhea, all made worse on a diet rich in starch. The cause of this intestinal disturbance is supposed to be due to one or two things: (1) Deficiency of cellulose digestion. (2) Deficiency of starch

<sup>1</sup> Arch. f. Verdauungskr., 1912, vol. xviii, p. 303.

due to anomalous intestinal secretion. Arnold,<sup>1</sup> believing that diastase is lacking in such cases, has examined the stools quantitatively for this ferment, with absolutely negative results. Despite this, he thinks that the intestinal juices are lacking in power to digest the cellulose layer encompassing the starch granule, and hence the latter is poorly digested and not attacked at all, with the resulting symptoms of intestinal flatulence called fermentative dyspepsia.

**Enteroliths.** The unusual condition of enteroliths was met with by Anderson<sup>2</sup> from whose article the accompanying plate are reproduced. Anderson believes the picture is the only *x*-ray photograph in existence of enteroliths *in situ*.

**Angina Abdominis.** The paper on this condition by Sir Lauder Brunton and Mr. W. E. Williams, which was reviewed last year (p. 107), was followed by the report of a similar case by Hunter.<sup>3</sup> The patient was a man, aged fifty-six years, who had been complaining of pain in the epigastrium for eighteen months. This was at first dull and aching in character, usually coming on about an hour after eating, and sometimes relieved by taking food. There was some flatulence, but no vomiting. Shortly before coming under observation, the patient's pain had become altered, and, instead of being dull and aching, it was now paroxysmal, being sharp and shooting in character, without, however any relation to food.

The patient eventually died, apparently from myocardial failure, and the autopsy, among other things, revealed the presence of marked arterial changes. Hunter does not offer any explanation as to the cause of the pain, but does not believe it is vasomotor in origin as, during the attacks, there was no change in blood pressure. The effect of nitrites was not studied in this case.

**Relation of Size of Abdomen to General Nutrition.** Von Sohlern<sup>4</sup> endeavors to draw a relationship between a small abdomen and the general health and state of nutrition. He holds that some individuals have too small stomachs in comparison to their build, and that it is not unlikely that with this goes a congenital smallness of the stomach and intestines. Despite a good appetite and absence of any symptoms, the food intake is insufficient for the body needs, and there results more or less malnutrition and emaciation, with digestive disturbances, visceroptosis, and neurasthenia. In the article above cited, the author gives tables showing measurements from various parts of the body in subjects with large and small abdomens, and compares them with the normal. The anatomical landmarks are measured, *i. e.*, from the suprasternal notch to tip of xiphoid, from tip of xiphoid to the umbilicus,

<sup>1</sup> Zentralbl. f. inn. Med., 1913, vol. xxxiv, p. 1.

<sup>2</sup> British Medical Journal, 1913, vol. i, p. 931.

<sup>3</sup> Lancet, 1912, vol. ii, p. 12.

<sup>4</sup> Med. Klin., 1912, p. 1541.

and so forth. Case records are quoted and five pictures illustrate his text. Without describing his reasonings in detail it will suffice to repeat his conclusions.

1. There are individuals with abnormally small and abnormally large abdomens, and both must be regarded as congenital anomalies.

2. The small abdomen predisposes to emaciation with resulting ptosis, chronic constipation and neurasthenia, the large abdomen predisposes to general obesity.

Von Sohlern's paper is, to me, far from convincing. It is incomprehensible how he can hold the small abdomen to be the cause of "chronic pulmonary tuberculosis," "pyloric stenosis—gastrectasia," "hyperacidity." He does not suggest the possibility of these conditions being responsible for the small abdomen, though this inference is perfectly obvious. Again, the large abdomen was associated twice with diabetes. What are we to think of this? The author has done an immense amount of work, but it is the case of the mountain struggling and bringing forth a mouse.

**The Stools.** CHARACTER OF THE STOOLS. For the quality of the stool, the motility of the intestine is not so much concerned as the motility of the lowest portion of the large intestine (descending colon, sigmoid, rectum). A constipated stool can be observed, despite abnormally fast propulsion through the intestine, on account of normal or delayed passage through the above-mentioned portions of the gut. The main condition for a diarrheic movement is hypermotility of the entire gastro-intestinal tract. In achylia gastrica there is an exaggerated motility of the whole tract and hence diarrhea, but if there is hypermotility only in the upper portion (as far as the splenic flexure) then the passage through the lower bowel will be delayed, and normal or hard stools will be the result. In hyperacidity, constipation is the rule, as there is generally delayed expulsion of food from the stomach owing to the pyloric reflex. When there is hypermotility of the stomach and hyperacidity, then the bowel movements will be loose. Hence, from the character of the stools alone, one can draw no inference as to the chemistry of the stomach. The author<sup>1</sup> does not explain the rather characteristic intermittent diarrhea and constipation of achylia. It is, of course, due, according to him, to the intestinal hypermotility, but one would like information as to the cause of the intermitting.

**FAT IN THE STOOLS.** For the detection of fat in the stools, Lorisch<sup>2</sup> recommends Nilblau-G, an anilin derivative, technically called diethyl phenyl-p-ammonium-a-amido naphtoxazin. It has the property of coloring the acid a blue-violet color and neutral fat red, that is, the color of the base (metachromatic property). This is a great improvement over the other methods for testing for fat, as even the specially trained

<sup>1</sup> Jonas, Arch. f. Verdauungskr., 1912, vol. xviii, p. 769.

<sup>2</sup> Arch. f. Verdauungskr., 1912, vol. xviii, p. 636.

microscopist cannot differentiate between fatty acids and neutral fats when the former are not in typical needle-like crystals.

Lohrish recommends using a concentrated Nile-blue sulphate solution, though he does not state how strong it should be made. A portion of the stool is ground up well with water and mixed in a shallow dish with a few drops of the Nile-blue sulphate solution until the whole looks dark blue. A small portion is put on a slide and examined microscopically. Three colored plates accompany the article, and show most conclusively the sharp color distinction between neutral fat and the fatty acids.

**OCCULT BLOOD IN THE STOOLS.** Fuld<sup>1</sup> makes a plea for simplification of the tests for occult blood in order that the general practitioner who now feels that the test requires special chemical training, may find the task of feces examination a comparatively simple one. Fuld describes his method of collecting the feces, and his modification of Weber's test, but Boas<sup>2</sup> contends that the most important item in the whole subject of occult blood is to determine on a uniform technique, and not to make "Modifikationen" and "Modifikationchen" *ad infinitum*. He is now at work on a detailed comparative study of all the tests, with the expectation of arriving at the safest and simplest test. At present, he recommends<sup>3</sup> most highly his phenolphthalein test and the benzidin test.<sup>4</sup> Boas suggests that a quantitative estimation of the amount of blood might prove of some value.

Vas,<sup>5</sup> under the title "A source of error in the phenolphthalein test for occult blood," says that a patient who had been taking phenolphthalein for the bowels gave a positive reaction, although there was no occult blood. This is hardly a "source of error," and Boas rightly takes umbrage at this criticism of Vas.

In my paper above quoted, I have pointed out the necessity of excluding meat and certain drugs from the diet, as these and meat soups, meat extracts, etc., may give positive reaction with the sensitive benzidin test (1 to 200,000).

At the time of stopping meat, the patient should receive a 5-grain carmine capsule, and until the stool which follows the bright red colored stool has been collected, no meat should be indulged in. It is no doubt true that many individuals find great difficulty in abstaining from meat the required length of time, and it is to make this abstinence dispensable that the ever fertile-minded Boas<sup>6</sup> has devised this plan. His method of preparing the meat does not sound very appetizing, but it may be tried on those whose sensibilities are offended at the prohibition of meat. Hemoglobin is readily split by hydrogen peroxide, becoming thereby colorless, and Boas has made use of this fact.

<sup>1</sup> Berl. klin. Woch., 1912, p. 2077.

<sup>2</sup> Ibid., 1913, p. 154.

<sup>3</sup> Deutsch. med. Woch., 1911, No. 2.

<sup>4</sup> Goodman, American Journal of the Medical Sciences, October, 1907.

<sup>5</sup> Deutsch. med. Woch., 1912, p. 1412.

<sup>6</sup> Ibid., 1912, p. 2060.

100 to 125 grams of finely chopped veal or chicken meat are ground with 100 grams of 3 per cent. hydrogen peroxide solution. At first the mixture becomes frothy, and later white, and when this latter stage is reached the meat is well washed with water for 5 to 10 minutes, and then made into croquettes. Boas assures us that these dehemoglobinized croquettes are well liked by patients. He also is convinced that they do not interfere with tests for occult blood. German patients may crave meat to such an extent that they cannot forego its ingestion for twenty-four hours, even with the alternatives of eating this peroxide Hamburg steak, but American patients are not at all unwilling to abstain from meat when the rationale is explained to them, and it will rarely be necessary to recommend this emasculated food.

If there is any danger that the significance of *occult blood in carcinoma of the stomach* will be overlooked, then papers devoted to this subject are never superfluous. The positive tests range from 80 per cent. to 94.5 per cent. according to Bardachzi,<sup>1</sup> but I should be inclined to place the percentage at 100. Perhaps another way of expressing the same thought is, that carcinoma can be excluded if a large portion of feces fails to give a positive test for blood. Bardachzi extols anew the benzidin test, which, in my opinion, is the simplest, and perhaps the most reliable, test for blood.

Schlessinger and Jagielski<sup>2</sup> have made comparative studies with the guaiac, phenolphthalein, and benzidin tests, and arrive at the same conclusion as to the value of the benzidin test. They find the guaiac test not sensitive enough for traces of blood, and that the phenolphthalein method is far inferior to the benzidin.

A source of error in testing for occult blood is bleeding points in the rectum, and, apart from hemorrhoids, a fruitful cause of the minute hemorrhages is benign polyps of the large intestine. These are generally found<sup>3</sup> in the rectum as solitary or multiple new growths, attached to the mucous membrane by a pedicle.

**Rectal Feeding.** The assumption that foodstuffs may be metabolized after introduction into the rectum is the basis of nutrient enemas. Salt water and dextrose are undoubtedly made use of by the organism, the former for water metabolism and the other for the dynamics of the body, but the protein utilization is not so definitely understood. Mutch and Ryffel<sup>4</sup> found, in a child, aged six years, that 88 per cent. of the nitrogen of peptonized milk was absorbed, and 99 per cent. of the dextrose. On the days when peptonized milk was given, the indican reaction in the urine was well marked, but on the days when dextrose was administered no indican was found, indicating the probability that

<sup>1</sup> Wien. klin. Woch., 1912, p. 1531.

<sup>2</sup> Med. Klin., 1913, p. 417.

<sup>3</sup> Decker, Münch. med. Woch., 1913, p. 589.

<sup>4</sup> British Medical Journal, 1913, vol. i, p. 111.

bacterial decomposition is necessary before protein can be absorbed in this way. The authors question the advisability of giving protein material if toxic substances are produced and absorbed. They recommend, instead of the ordinary saline solution, fifteen ounces of a 6 per cent. solution of dextrose in tap water, as this supplies as much water to the body and furthermore diminishes nitrogenous waste.

Eberhard<sup>1</sup> makes the suggestion that nutrient feeding *per rectum* be given by the drop method. His technique is, first, to cleanse the rectum and colon with warm salt solution. Elevate the head of the bed and after warming the nutriment to body heat, it is placed in a warm bath at 110° to 115° F. (The author depicts his own reservoir.) The flow of the liquid is one drop per second.

It requires about one to one and a half hours for ten ounces of milk and two raw eggs to flow into the rectum. The following enemas are recommended:

Whites of three eggs . . . . .	90	calories
Peptonized milk . . . . .	174	"
Table salt . . . . .	0	"
Warm milk, 9 ounces . . . . .	174	"
Yellow of two eggs . . . . .	122	"
Grape sugar, 1 dram . . . . .	14	"
Table salt, $\frac{1}{2}$ dram . . . . .	0	"
Warm milk, 9 ounces . . . . .	174	"
Two raw eggs . . . . .	140	"
Table salt . . . . .	0	"
Essence of pepsin, 1 dram . . . . .	0	"

The last-named formula is the best, and is prepared as follows: First heat the milk to about 98° to 100° F., then beat the eggs, salt, and pepsin together, add the milk, and beat again until the whole is of such consistency that it drops easily.

#### DISEASES OF THE PERITONEUM.

**Tuberculous Peritonitis.** Bagozzi<sup>2</sup> gives the result of operations performed on 187 cases in a hospital in Milan. The mortality was high, 25 per cent., but this is due to the fact that such patients were not referred to the surgical wards until all other measures had failed. In a number of cases other organs were involved in the tuberculosis process, such a condition being, according to Bagozzi, an absolute contra-indication to operation. The best time to operate is after the acute febrile stage, the end of the first period, but without waiting until the patient

<sup>1</sup> American Journal of Gastro-enterology, 1912, vol. ii, p. 5.

<sup>2</sup> Abstract, Journal of the American Medical Association, 1912, vol. lix, p. 122.

becomes debilitated and loses flesh, or other organs become involved. Improvement or a cure was realized in both forms of tuberculous peritonitis, with and without effusion. One case with the plastic form recovered completely after a simple laparotomy.

The beneficial results which are seen after exposing the peritoneum to the air, are brought about sooner if the peritoneum is painted with 10 per cent. tincture of iodine. This method was first described by Hofmann<sup>1</sup> and is favorably reported on by Falkner.<sup>2</sup> Some have decried the method on account of the danger of forming adhesions, but Falkner, and others before him, have found little foundation for this apprehension.

The almost universal application of the *x*-ray in the treatment of disease, and the sometimes disheartening failure of surgery to cure tuberculous peritonitis has induced Falk<sup>3</sup> to experiment with the Röntgen ray in animals. In the latter, provided no other organs were involved, the direct use of the *x*-ray on the peritoneum seemed to be of great value and to produce no bad results. This work of Falk is most suggestive, and it seems not at all unreasonable to expect some reinforcement of the improvement following laparotomy, by using the *x*-ray at the time of operation.

Osten<sup>4</sup> has had success with permanent drainage in a case which could not be operated on on account of diabetes and myocarditis, and who was under the necessity of having repeated punctures at frequent intervals. Osten inserted a soft catheter through a large trocar, removed the latter, fastened the catheter with collodion and adhesive plaster, and closed it with a well-fitting clamp. The patient was able to "tap" himself whenever the fluid caused any disturbance. There was no local infection at the end of three months. This method is deserving of a trial in cases in which operation is refused, or in which repeated tappings are not tolerated.

#### DISEASES OF THE LIVER.

**Experimental Cirrhosis of the Liver.** The question of the effect of alcohol on the production of connective-tissue overgrowth in the liver is a subject which seems to be ever new, notwithstanding the fact that it was first studied by Dahlström, in 1852. For a good review of the literature, see Saltykow.<sup>5</sup> Lissauer<sup>6</sup> classifies the work to date in three main groups.

<sup>1</sup> Münch. med. Woch., 1912, No. 10.

<sup>2</sup> Ibid., 1913, p. 978.

<sup>3</sup> Berl. klin. Woch., 1912, p. 2176.

<sup>4</sup> Therap. d. Gegenwart., 1912, p. 523.

<sup>5</sup> Zentralbl. f. allg. Path., 1911, vol. xxii, No. 19.

<sup>6</sup> Deutsch. med. Woch., 1913, p. 18.

A great proportion of authors have come to absolutely negative results, among these being Dahlström. A second group found changes in the liver parenchyma, a more or less pronounced change with evidences of atrophic and necrotic processes, while a third group of investigators were able to produce interstitial changes which resemble very closely those seen in cirrhosis.

Lissauer has approached the subject anew, using rabbits, in which he injected ethyl alcohol and brandy intravenously. The results of his work show that he was able to cause changes in the liver, which, anatomically, at least, were those of cirrhosis. He shows good judgment in declining to apply his results to man, but the descriptions of his anatomical preparations and the cuts which accompany his article make one convinced of the pernicious effect of alcohol on the livers of experimental animals, to say nothing of the cirrhotic changes which it produces.

**CIRRHOSIS OF THE LIVER (TUBERCULOUS).** Hertz<sup>1</sup> believes that tuberculosis may be held responsible for a certain number of cases of cirrhosis of the liver, and he offers two cases as proof of his contention. Experimental work seems to bear this out, and Jousset is the strongest advocate from the clinical side, for he claims that a large proportion of cases generally regarded as ordinary cirrhosis are really tuberculous in origin.

Roque et Cordier<sup>2</sup> are certain, after a careful study of many cases, that every case of ascites in the course of Laennec's cirrhosis is of tuberculous nature. They believe also that a great many cases of cirrhosis are due not to alcohol but to tuberculosis.

**AUTOSEROTHERAPY.** Vitry and Sézary<sup>3</sup> report a case treated by autoserotherapy. 10 c.c. were withdrawn and reinjected subcutaneously, this being repeated every two days. On the third day there was a urinary crisis, followed by gradual absorption of the fluid, so that on the eleventh day, autoserotherapy had to be discontinued because of lack of fluid. The body weight fell coincidently with the increased output of urine, as can be seen from the chart.

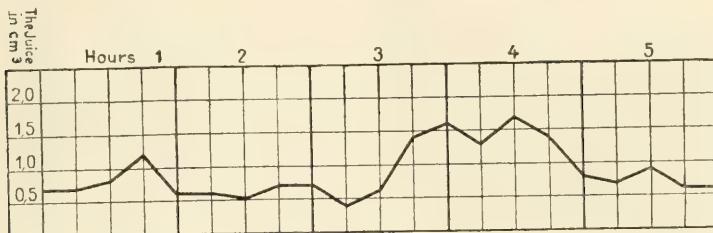
The authors are very careful not to ascribe to the autoserotherapy too much influence in clearing up the ascites, as they say in many other cases the results have been absolutely negative. I have tried this method in several cases of ascites secondary to hepatic cirrhosis, but have never convinced myself that it has had the slightest effect on the effusion. It has never been clear to me on just what ground one might look for improvement in such cases, unless it be that many of the cases are tuberculous in nature, as Roque and Cordier assert.

<sup>1</sup> Deutsch. med. Woch., 1912, p. 1692.

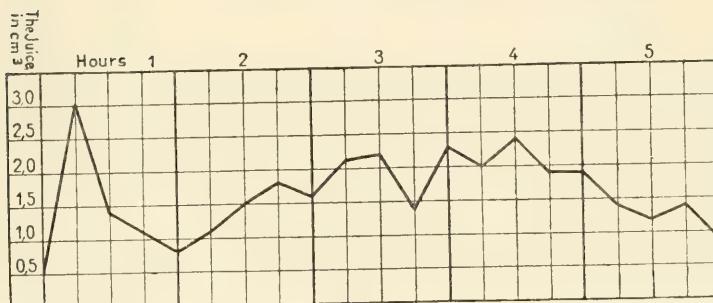
<sup>2</sup> Rev. de Méd., 1912, vol. xxxii, pp. 761, 878, 957.

<sup>3</sup> Ibid., 1913, vol. xxxiii, p. 86.

**Hepatitis.** The not infrequent occurrence of hepatitis in the course of an erysipelatous infection is called attention to by Hildebrandt.<sup>1</sup> This is recognized clinically by a pronounced urobilinuria which may



Curve of secretion for oil.



Curve of secretion for urea.

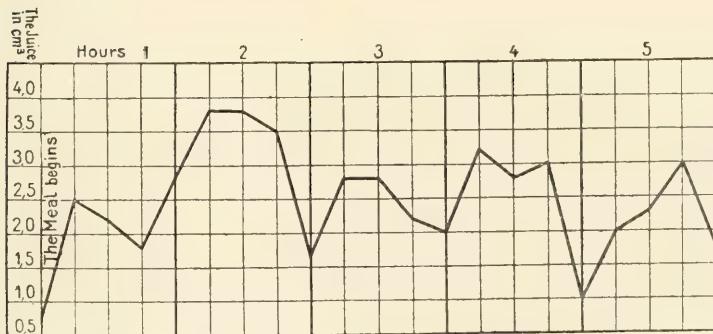


FIG. 20.—Curve of secretion for carbohydrate.

alone give the clue to the nature of the complication. The hepatitis may be more than a transient condition and may long outlast the erysipelas, often requiring active treatment. Hildebrandt warns against

<sup>1</sup> Mitt. a. d. Grenzgeb., 1912, vol. xxv, p. 247.

operating under chloroform in the presence of acute parenchymatous hepatitis, such as is found in erysipelas.

In this connection, it may be of interest to call attention to another article by the same author<sup>1</sup> on experimental focal necrosis of the liver after chloroform poisoning. Hildebrandt believes that there is no doubt of the relation which exists between the two, but says, in addition, that a coexistent fat necrosis from the pancreas is an added danger of chloroform, and that in some cases there is no hepatic degeneration, only the fat necrosis. He urges that, before chloroform is employed, a careful examination of the liver be made, and the best index to the condition of this organ is to be found in the test for urobilinuria.

**Functional Tests of Hepatic Insufficiency.** If the reader is desirous of knowing the literature pertaining to means of diagnosing impaired liver function, he is referred to an article by Hohlweg<sup>2</sup> in which the subject is covered to 1909. Continuation of this subject is offered by Reiss and Jehu<sup>3</sup> and Isaac,<sup>4</sup> so that in these three articles will be found an almost complete bibliography. The carbohydrate metabolism being the simplest to study clinically, has received the most attention, with the result that alimentary levulosuria is now recognized as being a good index of hepatic insufficiency.<sup>5</sup>

**GALACTOSURIA.** Another variety of sugar, namely, galactose, is being used for diagnostic purposes, following the lead of Bauer.<sup>6</sup> d-Galactose is the aldehyde of the hexatonic alcohol, dulcitol, and has the structural formula  $\text{CH}_2\text{OH}(\text{CHOH})_4\text{COH}$ . It may be isolated by hydrolysis of milk-sugar (lactose), is dextrorotary, and is but slightly fermentable with yeast. It will be remembered that Sachs, in his paper (see my article *l.c.*), found a diminished tolerance for levulose in dehepatized frogs but not for galactose, and concluded, therefore, that galactose was not a glycogen-producing substance, at least not to the extent of levulose. Later work by Bauer and by Kausch and Socin on dogs has shown that, in dogs, lactose and galactose lead to a marked increase of the glycogen store in the liver, and it is believed that in man these sugars are to be classified with glucose, saccharose, maltose, and levulose, as glycogen producers.

Bauer, in his clinical work, gave 40 grams of galactose on a fasting stomach to normal men and to patients with hepatic disease. He found in the former, that it was combusted completely, whereas in the latter, alimentary galactosuria was a constant feature. Reiss and Jehu<sup>7</sup> have pursued this subject, using the following technique: 40 grams

<sup>1</sup> Mitt. a. d. Grenzgeb., 1912, vol. xxiv, p. 652.

<sup>2</sup> Deutsch. Arch. f. klin. Med., 1909, vol. xcvi, p. 443.

<sup>3</sup> Ibid., 1912, vol. cviii, p. 187.

<sup>4</sup> Berl. klin. Woch., 1913, p. 1167.

<sup>5</sup> Goodman, Journal of the American Medical Association, December, 18, 1909.

<sup>6</sup> Deutsch. med. Woch., 1908, p. 1505.

<sup>7</sup> Loc. cit.

of galactose are given in the morning on an empty stomach after the urine has been voided. The sugar is best administered in a glass of carbonated water, as the insipid sweetness might otherwise prove most distasteful. No sign of nausea or vomiting has followed the ingestion when in this form. The urine is collected in two portions of six hours each, and Reiss and Jehu made several tests, including the qualitative test for sugar and also the polaroscopic examination. Occasionally a normal person will excrete sugar, but Reiss and Jehu arbitrarily state, that only when the amount exceeds 2 grams, must the test be considered as pathological! Their results are as follows:

1. Cholelithiasis. Eight cases were studied, and, in two, the amount of galactose excreted passed the 2-gram limit.

2. Biliary obstruction through tumor. Five cases were observed, all of whom showed normal utilization.

3. Icterus occurring in syphilis showed two positive results in five cases examined.

4. Chronic passive congestion (Stauungsleber). Eight cases of this condition received the test and but once was it positive.

5. Hepatic cirrhosis. Fifteen patients were investigated, and in but one did the test show alimentary galactosuria.

6. Catarrhal icterus. In all, seventeen cases were seen, and fifteen had positive tests.

Reiss and Jehu conclude, tentatively, it must be admitted, that a marked alimentary galactosuria indicates (in the absence of febrile conditions) catarrhal icterus. No cases of phosphor poisoning, acute yellow atrophy, having come to their notice, the last statement must be held *sub judice*.

Moderate galactosuria is seen in the majority of liver conditions, excepting carcinoma, cholelithiasis, and Stauungsleber, so these last three may be excluded in the event of a positive test.

When the tolerance for galactose is normal, it speaks against catarrhal jaundice only, but normal values may be obtained in all other hepatic conditions. An experimental study follows their article.

Hirose<sup>1</sup> comes to somewhat different conclusions, as he has found the test very frequently in hepatic cirrhosis in addition to catarrhal icterus. This is a refutation of Reiss and Jehu's observation that negative results were the rule in cirrhosis. In addition, Hirose has found alimentary galactosuria in cholelithiasis, carcinoma, and in congestion, almost as frequently. It is evident that the test indicates in nowise the nature of the disease. It is possible, too, that other organs besides the liver are concerned in the utilization of galactose, as positive results are not infrequent in Graves' disease.

In experimental phosphor poisoning, Roubitschek<sup>2</sup> finds that ali-

<sup>1</sup> Deutsch. med. Woch., 1912, p. 1414.

<sup>2</sup> Deutsch. Arch. f. klin. Med., 1912, vol. cviii, p. 225.

mentary galactosuria is a constant phenomenon. Chase<sup>1</sup> believes if the galactose test is used with the urobilin test, that the diagnosis of hepatic conditions will be very much facilitated. He claims that the latter is a very delicate test of localized impaired liver function while the galactose test is more an index of a general functional disturbance.

An objection to the use of galactose is its cost, which makes its employment in the use of 40 grams a test a matter of no inconsiderable importance.

Ghedini<sup>2</sup> calls attention to a polarimetric test which is supposed to reveal the presence in the blood serum of a ferment which is the product of the living hepatic cell. This ferment is able to change glycogen into maltose, isomaltose, glucose, etc., and has been found in man in both blood and urine. In normal individuals, according to Ghedini, it is present in large amounts in normal individuals, and is scanty or absent in those with diseased livers. He adds 2 c.c. of blood serum to 10 c.c. of a 1.5 per cent. of glycogen. The ensuing turbid fluid is made limpid by the addition of a few drops of sodium hydrate solution. The mixture is allowed to stand an hour at 37° C., when twice the volume of potassium sulphocyanide is added and shaken until the salt is completely dissolved. The purpose of the salt is to clear up mixtures of serum in combination with glycogen without affecting the rotation of the plane of polarized light.

The deflection of the polarized light of the serum mixture is compared with a test mixture of glycogen and physiological serum. If the polarized light is deflected less than the test mixture, part of the glycogen has been reduced to glucose. From comparison of this method with other methods, Ghedini is convinced that it is a delicate and reliable means of determining, both qualitatively and quantitatively, the functional capacity of the liver.

**Urobilinogenuria.** Urobilinogen as a means of distinguishing between a hepatitis secondary to cardiac disease and a true hepatic disease is held in high esteem by Münzer.<sup>3</sup> He believes that chronic passive congestion, so long as it is not associated with disease of the liver cell, does not affect the urobilinogen excretion, but organic disease is always associated with marked urobilinogenuria. One should not speak of "urobilinuria" but should rather call the condition "urobilinogenuria," a point which Münzer is careful to emphasize. The test of Ehrlich, the hydrochloric acid solution of dimethylamidobenzaldehyde, is a test for urobilinogen and not for urobilin. Should the urine not be fresh, Münzer recommends that one use the test for urobilin devised by Schlessinger.<sup>4</sup> (Fluorescence with zinc chloride and ammonia.)

<sup>1</sup> Journal of the American Medical Association, 1912, vol. lix, p. 329.

<sup>2</sup> Abstract, Journal of the American Medical Association, 1913, vol. lx, p. 638.

<sup>3</sup> Med. Klin., 1913, p. 586.

<sup>4</sup> Deutsch. med. Woch., 1903, No. 32.

Wilbur and Addis<sup>1</sup> are in accord with Münzer's views, that is, so far as the significance in liver disease is concerned. They believe, however, that one should not stop at the diagnosis of liver disease when a persistent urobilinuria is encountered, but should make a careful study as well for all possible factors leading to blood destruction, as urobilin is an end-product of hemoglobin breakdown.

**Non-parasitic Cysts of the Liver.** Until a few years ago, non-parasitic cysts of the liver had received but scant attention, and they are still now so uncommon that such cases must be looked upon as curiosities. Boyd<sup>2</sup> contributes an important article to the subject, accepting Bland-Sutton's classification of general cystic disease and solitary cysts.

I. GENERAL CYSTIC DISEASE is, as a rule, constantly associated with cystic disease of the kidneys, and rarely of the pancreas, lungs, spleen, and brain. To date, 85 cases have been collected. "In the slighter forms of the disease, the cysts are generally found just beneath the liver capsule, but when the condition is well marked, the whole organ is affected, and may be enormously enlarged. The general shape of the liver is preserved, but the cysts may project on its surface. The size of the cysts varies from a microscopic acinus to a cavity the size of a pigeon's egg, or larger. Absorption of the wall between adjacent cysts may occur, and often, in the larger ones, the remains of septa can be seen. Microscopically, the cysts are found to be lined by a layer of epithelium, which is columnar in the smallest cysts, but as the cavity increases in size, the epithelium become cubical, and finally flattened. In the largest cysts, the epithelial lining cannot be demonstrated, having disappeared by pressure atrophy. In some cases, there is considerable increase in the amount of fibrous tissue in the portal spaces.

"The contents of the cysts are usually clear, watery fluid, sometimes yellowish brown in color. The fluid contains albumin, mucus, cholesterin, epithelium, and granular debris. No bile, or bile pigment, is generally present."

In addition to the macroscopic cysts, there is increase in the number of bile ducts, which are believed to be the starting place of the general cystic disease. Boyd, in his admirable article, has summarized the theories which have been offered to explain this disease. They are as follows:

1. That the cysts are formed by degeneration of liver cells (Pye-Smith), but Boyd thinks it is hardly possible that this alone could lead to the production of a space bounded by a definite fibrous wall lined by nucleated cells.

2. That the cysts are due to dilatation of the normal bile ducts, the latter being occluded by inflammatory connective tissue (Förster). This theory then interprets the cysts as simple retention cysts, but,

<sup>1</sup> Journal of the American Medical Association, 1912, vol. lix, p. 929.

<sup>2</sup> Lancet, 1913, vol. i, p. 951.

in many instances, there has been found no increase of connective tissue and no bile in the cysts' contents. There is often no icterus, so the retention theory seems scarcely tenable.

3. That the condition is due to an overgrowth of bile ducts, the biliary angiomas of Sabourin.

4. That the cysts are true cysto-adenomas (Siegmund and von Hippel).

5. That the cysts are really tumors of embryonic remains (Borst and Ribbert).

Boyd does not enlighten us as to the most acceptable theory, and offers no explanation on his own account.

II. SOLITARY CYSTS. While general cystic disease has some pathological interest, solitary cysts of the liver are of considerable clinical importance, as they may sometimes be diagnosed and yield readily to surgical treatment. Boyd says that although the term "solitary cysts" is a useful one, the cysts are not in truth solitary, but "potential" cysts will be found in the adjacent liver tissue resembling somewhat the dilated bile ducts seen in general cystic disease. Solitary cysts occur usually in adults, and are situated near the free margin or under-surface of the liver, being more or less pedunculated but having no suggestion of a pedicle. Theories to explain this variety of cysts are as numerous as those offered to explain the etiology of the multicystic variety. Boyd has reviewed the literature, and in reporting a case of non-parasitic disease coming under his own care, he appends an instructive table of all cases reported so far.

As regards the clinical features of solitary, non-parasitic cysts of the liver, the most striking point is, that the cysts occur in females in 86 per cent. of the cases. This is in agreement with its suggested congenital origin, as developmental defects are known to be more common in that sex. The age of the patients varies in Boyd's table between eighteen months and seventy-five years.

Pain is a valuable symptom depending probably on the associated peritonitis. Gastro-intestinal symptoms are not infrequent—dyspepsia, vomiting, and irregular action of the bowels. Jaundice, emaciation, loss of weight, and undue perspiration were seen occasionally.

In nearly all cases an abdominal tumor was present, varying in size from a comparatively small tumor to one occupying the whole abdomen and giving rise, in the latter instance, to well-marked pulmonary and vesical symptoms. Fluctuation can be elicited, but the surface feel gives the sense of fluid under low tension. There was distention of the abdominal veins in but one case, that of Boyd's.

As far as the prognosis is concerned, it is not unfavorable if the condition is operated upon. Operative procedure is the only means at hand for the relief of the disease.

**Jaundice. BANTI'S DISEASE.** This singular disease, if it can be called a disease of itself, is shrouded in so much mystery that papers devoted to its explanation or elucidation are most acceptable. Though clinically well-known and frequently spoken of, it is noteworthy that the disease as a whole is so cavalierly treated in text-books. According to Banti, whose opinion, by the way, is not generally shared, the disease manifests itself first in a stage of moderate splenomegaly with anemia, which lasts from three to ten years, then follows a stage of years' duration, in which the liver is found to be enlarged, there is urobilinuria and a dirty-yellow hue to the skin. After this, the liver begins to shrink in consequence of beginning connective tissue overgrowth and the clinical picture eventually becomes that of the atrophic form of cirrhosis with ascites. In this stage the icterus increases, there are often hemorrhages from the stomach and intestine, and the anemia is very pronounced. As far as the blood is concerned, there is always a lowered color index, the leukocytes are generally decreased in number, there is increase of the large mononuclear cells, but no myelocytes.

The pathology of the condition seems to be obscure.

The characteristic feature is, however, splenic fibro-adenopathy, widening of the intravascular tissue, diminution of the size of the venous sinuses, and degeneration of the follicles. The changes in the liver resemble at first those in the spleen—endophlebitis, connective-tissue hyperplasia, and, finally, the changes seen in alcoholic cirrhosis. It may be stated, however, that many cases are diagnosed Banti's disease which have not the pathology described above.

Lommel<sup>1</sup> believes that the hemolytic icterus which is so much talked about in French literature is identical with Banti's disease, and that both are the same disease. Disturbances of nitrogen equilibrium, which has been emphasized of late, he believes is not at all characteristic, nor is the observation of Widal and Chauffard, that there is a lessened resistance of the erythrocytes to osmotic influence, of any value. Grosser and Schaub<sup>2</sup> seem to incline to the view that Banti's disease is, in reality, a well-defined condition, although they failed to find nitrogen loss. This they offer in their case as evidence that the disease in the early stages has its origin in the spleen and that the hepatic changes are secondary.

Under the title, "Ueber chronischen acholurischen Icterus mit chronischer Splenomegalie," Lichtwitz<sup>3</sup> reports observations made on some cases, which resemble, in their clinical history, very closely the cases of Banti's disease described by the authors quoted above. Lichtwitz seems to lay emphasis on the nitrogen metabolism which was normal in his case, but we have learned above that this is really no safe index.

<sup>1</sup> Deutsch. Arch. f. klin. Med., 1912, vol. cix, p. 174.

<sup>2</sup> Münch. med. Woch., 1913, p. 76.

<sup>3</sup> Deutsch. Arch. f. klin. Med., 1912, vol. evi, p. 545.

EPIDEMIC CATARRHAL JAUNDICE. One of the most important papers of the year on this subject is that of Cockayne,<sup>1</sup> but the original matter not being at hand while this is being written, I must borrow from Guthrie's paper,<sup>2</sup> also a valuable contribution. In Cockayne's paper there is a full bibliography, and a complete account of epidemics throughout the world, although some small ones are overlooked and are recorded in Guthrie's article. From India appears a work by Hodge<sup>3</sup> on 34 cases occurring in natives, so that in these three papers will be found complete material to date.

A distinction must be made, says Guthrie, between epidemic infectious jaundice (Weil's disease) and epidemic catarrhal jaundice. The symptoms are alike in both, except those of Weil's disease are much more severe, and the mortality varies from 10 to 60 per cent. The icterus in Weil's disease is associated with urticaria, petechiæ, hemorrhages from the nose and stomach, fever, splenic tumor, nausea, vomiting, diarrhea, and albuminuria. At autopsy the changes are those of acute yellow atrophy. The etiological factor is the *Bacillus proteus fluorescens* which is taken into the system with contaminated food or water.

The epidemics of catarrhal jaundice, on the other hand, are usually mild, although deaths have been recorded. It is not unlikely that these fatal cases were cases of Weil's disease, as the symptoms were similar and the autopsy findings those of epidemic infectious jaundice.

Hodge's treatment proved successful in his Indian epidemic. A blue mass pill was given on admission, and repeated every three or four days. The following mixture was given thrice daily.

Ac. nitrohydrochloric dil.	.. . . . .	mx
Ammonium chloride	.. . . . .	gr. x
Magnesium sulphate	.. . . . .	gr. xx
Infusion chiretta	.. . . . .	ad ʒj

TUBERCULOSIS OF THE LIVER. The occurrence of *jaundice in tuberculosis of the liver* is so rare that the subject has received but little attention. Milne<sup>4</sup> reports 2 cases. The course of the disease was typical of tuberculosis, but, in addition, there was marked jaundice. At autopsy, the liver and spleen were especially involved, and the author believes that they were infected from a diseased mesenteric gland. The French have devoted considerable study to this condition, as is shown by the references appended to Milne's article.

JAUNDICE AND PANCREATITIS. The occurrence of pancreatitis with jaundice in scarlet fever and in diphtheria is made the subject of a short article by Goldie<sup>5</sup> in which he reports three cases of the first infection

<sup>1</sup> Quarterly Journal of Medicine, 1912, vol. vi, p. 1.

<sup>2</sup> British Journal of Children's Diseases, 1913, vol. x, p. 1.

<sup>3</sup> Indian Medical Gazette, 1912, vol. xlvi, p. 270.

<sup>4</sup> New York Medical Journal, 1913, vol. xcvi, p. 978.

<sup>5</sup> Lancet, 1912, vol. ii, p. 1295.

and one case of the second. Jaundice does sometimes occur in scarlet fever, but it must be very rare, as Murchison has seen but 5 instances in 2000 cases of scarlet fever, 3 of which died. This type is very rare, and, in all probability, is a toxemic form associated with hepatic degeneration, but the type which Goldie describes is no doubt of pancreatic origin, as his case records clearly show. The jaundice is obstructive in type, is mild and transient in character, and unattended by any danger to life. Infection of the pancreas is probably the cause. This is interesting, and has a definite bearing on Deaver's paper, which explains pancreatitis on the same ground.

**EFFECTS OF JAUNDICE ON THE PANCREATIC SECRETION.** A series of experiments which may have a bearing on human pathology was performed by Brown.<sup>1</sup> As is well known, the pancreatic secretion varies greatly with the different varieties of food ingested, starchy food calling forth the most juice and fat the least. The richness in ferment being inversely proportional to the quantity of juice secreted. The flow of bile is closely related to the output of pancreatic juice, being generally increased when the latter is increased. Food plays some role in the calling forth of bile, although fat stands between carbohydrate and protein in the bile-forming power. Apart from the effect of food there are other influences, namely, hormones and nervous, and it would seem that the flow of bile from the gall-bladder depends on reflex influences from the duodenal mucous membrane. Bile has an activating power on the pancreatic juice and aids in fat absorption, so that when icterus occurs we have three things to consider, as Brown says: (1) The effects due to lack of bile in the intestine manifesting themselves in digestive disturbances; (2) the effects due to bile circulating in the blood, and (3) the disturbances produced in the liver cell by the action of the concentrated bile under increased pressure.

Brown's experiments had for their object the study of the effect on pancreatic secretion of ligation of the ductus choledochus.

After ligation of the duct with the production of jaundice, there was a marked reversal in the pancreatic juice as regards the amount of ferment richness. There was more juice with milk than with meat, and the trypsin and diastase were decreased instead of being increased as before the appearance of jaundice. When both bile and the major part of the pancreatic juice were withdrawn from the intestine, there was a very rapid loss of weight and strength, and sudden death. This seems to emphasize the great importance of the bile as a partial substitute for the pancreatic secretion when the latter is diminished.

**Congenital Obliteration of the Bile Ducts.** Hess<sup>2</sup> thinks inasmuch as with the congenital obliteration of the bile ducts there is "obliteration of the common bile duct, and pancreatic duct, that it would seem

<sup>1</sup> Johns Hopkins Hospital Bulletin, September, 1912, p. 263.

<sup>2</sup> Archives of Internal Medicine, 1912, vol. x, p. 37.

preferable to term this disease "congenital obliteration of the common bile duct and pancreatic duct." He favors a grouping from the clinical point of view, to wit: (1) when associated with the common bile duct there is an obliteration of the pancreatic duct, which, however, is compensated for by the fact that the accessory duct, the duct of Santorini, is present and able to excrete the pancreatic ferments into the duodenum, (2) when the obliteration of the excretory apparatus of the pancreas is total and complete, as not only is the duct of Wirsung absolutely obstructed, but no accessory pancreatic duct exists.

Hess describes a case which fits in the first group, in which, during life, trypsin, amylase, and lipase were repeatedly found in the duodenal contents after aspiration. Bile was found in the stools despite the absolute closure of the common duct, a phenomenon which he explains as the basis of excretion of bile from the circulation through the intestinal wall.

The literature is carefully reviewed by Milne<sup>1</sup> and the cases reported analyzed in detail so far as the anatomical findings are concerned.

A case of congenital absence of the gall-bladder is reported by Blake-way.<sup>2</sup>

**Cholelithiasis.** Moynihan<sup>3</sup> does not believe in the medical fallacy that many cases of gall-stones exist without symptoms, but thinks that the vague term "indigestion" is used variously by patients to indicate all the several forms of distress which are the forerunners of a crisis of acute biliary colic. He calls attention to the fact that the "dyspepsia" and the final gall-stone attack are rarely correlated in the physician's mind, and he is insistent that a large majority of patients who have suffered for a long time from "gastric disorders" have really no organic disease of the stomach, but have a real structural change in the gall-bladder or the appendix. His phrase is almost epigrammatic, and is worth the quoting. "It is the stomach, whose sensibilities are tender, that cries out the warning when other organs are suffering attack."

The so-called inaugural symptoms are described by Moynihan, as follows: "The patient complains of a fulness, weight, and distention, or oppression in the epigastrium coming on soon after meals, within half- or three-quarters of an hour, relieved by belching, and dismissed almost on the instant by vomiting, elicited with remarkable constancy by certain articles of diet, especially those of a "greasy" nature, and dependent rather upon the quality rather than upon the quantity of food. There is a sensation of great tightness, which, if unrelieved, may become acute pain, from which the patient obtains ease by bending the body forward, by flexing the right thigh on the abdomen, or by loosening all garments which fit tightly to the waist. There is frequently great complaint of "acidity," or heart-burn, and in the act of belching

<sup>1</sup> Quarterly Journal of Medicine, 1912, vol. v, p. 409.

<sup>2</sup> Lancet, 1912, vol. ii, p. 365.

<sup>3</sup> British Medical Journal, 1913, vol. i, p. 8.

there may be some acid regurgitation. While the discomfort lasts, the patient may notice a "catch" in his breath, and he finds, perhaps, that it is impossible to breathe deeply without feeling an acute stabbing pain at the right costal margin. There may be a faintness and nausea, and, rarely, vomiting may occur spontaneously. After a more than usually severe attack of "indigestion," the body and side may feel stiff for several days. A frequent and a very characteristic early symptom of cholelithiasis is the occurrence, during the attack of indigestion, of a slight sensation of chilliness, especially in the evenings after a meal. The patient may shiver for several minutes, and may hasten from the table to huddle over a fire. The sensation of "goose flesh" is often experienced, and several medical men upon whom I have operated have said that in the severe phase it was not unlike a very slight rigor, the chilly stage being quickly followed by one in which the body feels hot and the skin begins to act freely. "These symptoms may persist even for years before the attack of severe pain occurs. The cause of the biliary colic is impaction of the stone in the cystic duct."

As to treatment, Moynihan says emphatically, "There is, of course, no medical treatment of gall-stones," and again, "I hold that when once a diagnosis of gall-stones has been made, operation is always indicated unless there are grave reasons forbidding resort to surgery."

Miyake<sup>1</sup> has made an interesting statistical study of the occurrence of gall-stones in Japan and in Germany, and seeks to draw some inference therefrom as to the etiological factors. The first observation is that gall-stones are far less frequent in Japan than in Germany, and that there is no great difference between the sexes, females being slightly more often affected than males (3 to 2).

Having settled the relative infrequency of cholelithiasis in Japan as compared to Germany, Miyake seeks to explain this frequency by asking and answering three pertinent questions:

1. What difference is there in the conduct of life of the two nations which might exert an influence in the occurrence of gall-stones?
2. What difference is there in the structure of the gall-stones?
3. What difference is there in the composition of the bile in the two nations?

Inasmuch as the German may be considered a fair type of the Western peoples, Miyake's queries hold an interest for us in America.

Ad. 1. The author believes the European custom of wearing corsets is a prime factor, and regards pregnancy as having a subordinate influence. He says, "Pregnancy is a physiological process in mature female life, is common to women the world over, and surely there is no great difference between Japan and Germany so far as pregnancy is concerned," a naive expression from this canny oriental. He makes

<sup>1</sup> Arch. f. klin. Chir., 1913, vol. c, p. 54.

it clear that pregnancy seems to play some role, as women in Japan were slightly more susceptible to gall-stones than men, but he makes it no less clear that pregnancy is not the factor which in Europe it is held to be.

Ad. 2. The reader is well informed, no doubt, concerning the classification of gall-stones given by Aschoff and Baemeister, but it might be well to give this classification place at this point. Two main groups were made by them, broadly speaking, the aseptic stones and the inflammatory stones.

I. Aseptic gall-stone. Cholesterin stone, radiating in appearance.  
II. Inflammatory gall-stone. Calcium stones.

- (a) Striated cholesterin calcium stone.
- (b) Cholesterin pigment calcium stone.
- (c) Bilirubin calcium stone.
- (d) Common duct stone.

Miyake submits personal analyses of calculi, and shows that the pigment stone is much more common than the cholesterin stone, a fact which is explained by the composition of the bile. Of 56 cases of gall-stones studied, 10, or 17.9 per cent., were due to parasites.

Ad. 3. The answer to the reason why cholesterin stones are relatively infrequent in Japan is, that the bile of the Japanese contains less cholesterin than that of the European. Some years ago, I<sup>1</sup> showed for the first time, that the cholesterin contents of the bile could be raised by feeding large amounts of fatty and albuminous food, and Miyake makes use of this observation. He points out that the peoples of Japan eat much less food of that nature than do Europeans, and he holds that this is a not unimportant cause of the low amount of cholesterin and the infrequency of the stone.

Miyake believes that the absence of corsets in Japan is the principal reason why gall-stones are so infrequent, but the quality of the food is also an important factor, being poor in fat and albumin, and hence less likely to favor the production of cholesterin. In the majority of cases, the gall-bladder was found to be infected with the colon bacillus, which probably gained entrance through the common duct. Infection from the liver seems unlikely.

**SOLUBILITY OF GALL-STONES.** So much has been written, says v. Hansemann,<sup>2</sup> about the formation of gall-stones, that the question of their solubility has been almost entirely neglected. He shows that, under certain circumstances, gall-stones may be broken up while in the gall-bladder. His experiments were made on dogs in whose gall-bladder stones were placed. After a certain length of time, the dog was killed, the gall-stone removed and weighed.

In one case, 1.08 grams were lost in seventy-one days, the stone

<sup>1</sup> Beitr. z. chem. Physiol. u. Pathol., 1907, vol. ix, p. 91.

<sup>2</sup> Virchow's Arch., 1913, vol. cexii, p. 139.

weighing originally 1.58 grams, and later 0.5 grams, a loss of 0.015 grams *per diem*. He urges the continuance of studies directed toward the means of dissolving gall-stones, for he thinks his own work, and that of his predecessors, show conclusively that gall-stones are susceptible to dissolution.

**Volvulus of the Gall-bladder.** According to Kubig,<sup>1</sup> who reports a case, there are now on record but four instances of this extremely rare condition. All of the patients were of advanced years and, in each, the gall-bladder was very large, with a long cystic duct permitting the organ to hang free of the liver. As far as the diagnosis is concerned, pain and vomiting, distention of the abdomen, rigidity of the latter's walls, pain on pressure in the appendiceal and gall-bladder region, and tumor. In no instance was the diagnosis made correctly *intra vitam*, but the symptoms were interpreted as pointing to empyema of the gall-bladder, cholelithiasis, appendicitis, hydronephrosis.

**White Bile.** Kausch<sup>2</sup> and Berg<sup>3</sup> have put on record cases of so-called white bile occurring in hydrops of the biliary tract. The latter condition does not seem to be extremely rare, and usually follows absolute obstruction of the common duct. Quincke states that the amount of bile which may collect in the bile passages may be as much as one liter, and that the bile becomes colorless after a time.

Bertog<sup>4</sup> reports a case which is considered most thoughtfully. The so-called white bile is found only in cases when the obstruction is absolute and permanent. As to the length of time required before the bile becomes colorless, this seems to be questionable, but it must be at least so long that there is total resorption of all the bile which is in the bile passages. The pressure in the latter must be so great that the liver cells cannot overcome it. A factor in the production of white bile is the excretion of mucus by the bile passages.

**Influence of Bile on Intestinal Putrefaction.** One of the common legends in medical circles is that the bile has antiseptic properties and prevents the development of bacteria, a myth which has been more or less permanently disproved by the putrefaction of bile itself if left exposed. Roger<sup>5</sup> has made some studies *in vitro* of the action of bile on the various varieties of bacteria and concludes that, although one can in nowise speak of the bile preventing the growth of the organisms, still their growth is markedly interfered with. This action is especially excited in the organisms which break down protein material, and when added to bouillon or peptone water, the decomposition products are markedly diminished in amount. Roger concludes that bile plays an important role in preventing intestinal putrefaction, by developing

<sup>1</sup> Münch. med. Woch., 1912, p. 1998.

<sup>2</sup> Mitt. a. d. Grenzgeb. d. Med. u. Chir., 1911, vol. xxiii.

<sup>3</sup> Ibid., 1912, vol. xxiv.

<sup>4</sup> Ibid., 1913, vol. xxvi, p. 49.

<sup>5</sup> Arch. des Mal. de l'App. Dig., 1913, p. 121.

organisms to the detriment of the anaërobic varieties, by diminishing the secretion of the bacterial ferments and by neutralizing the toxic products of the microorganisms.

### DISEASES OF THE PANCREAS.

**Pancreatic Juice in the Normal Man.** An opportunity to study the ferments of the human pancreatic juice was presented to Holsti<sup>1</sup> in the form of a man suffering from a pancreatic fistula. Holsti, recognizing the fact that an individual with a pancreatic fistula usually possesses diseased pancreas, a truth disclosed by Bernard and Heidenhein in dogs, disarms criticism by comparing the analyses in his case with those in the case of Glaessner, where the juice was obtained direct from the duct of Wirsung. Inasmuch as Holsti and Glaessner's results are almost exactly alike, one may assume that the pancreas in the former's patient was normal, functionally at least.

So far as the influence of the three types of food on the amount of secretion is concerned, the following three curves are a graphic representation.

With carbohydrates the secretion begins immediately, persists at a high level during the entire digestion period and reaches the maximum in the second hour.

Meat causes no rise, except the initial rise, during the first hour, but the secretion begins to be increased about the middle of the second hour and reaches the maximum in the third or fourth hour.

The amount of secretion called forth by oil is practically *nil* before the third hour, when the maximum is seen. At the end of the fourth hour, the amount has again reached *nil*.

Other substances seem to exert an influence on the secretion, and, of these, water, hydrochloric acid, sodium bicarbonate, pepper, atropin, and pilocarpin were studied.

Water causes a great increase of secretion, the amount of the latter not being proportional to the amount of the water ingested. Hydrochloric acid is a great secretory stimulant, and sodium bicarbonate inhibits the flow of juice. Pepper causes no greater flow of juice than does water, that is, no increase is seen in the first hour, but after that there is a marked stimulative action. Atropin inhibited the secretion for an hour, but after that time the amount of juice is the same as the amount seen on the diet without atropin. Pilocarpin increased the amount of secretion. So far as the ferments are concerned, the following facts were brought to light.

**DIASTASE.** The amount of this ferment increases immediately after the ingestion of food, except when the secretion reaches the large amount seen in the first and second hours after carbohydrate food.

<sup>1</sup> Deutsch. Arch. f. klin. Med., 1913, vol. cxi, p. 48.

In the various hours following eating, the concentration of diastase varies, but is generally indirectly proportional to the amount of juice secreted. The amount of ferment is least on carbohydrate food, more after bread and cream, still more after meat, and most with oil.

**LIPASE.** Results exactly resembling the above were obtained after the study of the lipase secretion.

**TRYPSIN.** The activity of trypsin depends essentially on the amount of enterokinase present.

We have been taught by Starling, that the secretion of pancreatic juice was inaugurated by the hormone secretion, which is liberated from the duodenal mucous membrane following the contact of hydrochloric acid. Holsti claims there is a flow of juice, however, immediately after the intake of food, and that the stomach plays no role whatsoever in this. This initial flow of juice lasts about one hour, and then its subsequent production is directly dependent on the kind of food. This relationship undoubtedly depends in turn on the emptying time of the stomach for certain foods. Inasmuch as the pancreatic secretion is not continuous, but proceeds in the form of waves, it is fair to presume that this curve is influenced by the entrance, intermittent as it is, of food into the intestine.

**Chronic Pancreatitis.** The cause of chronic pancreatitis is, according to Deaver,<sup>1</sup> a pancreatic lymphangitis, and he lays very little weight on infection through the general circulation and on infection by direct contiguity from adjacent structures. The primary infection may lie anywhere in the abdominal cavity, and the retroperitoneal lymphangitis which results, is fraught with the possibility of injury to the pancreas lying almost directly in the path of the lymphangitis. He writes: "The pancreas, unlike certain other organs, possesses no great hilum through which pass the afferent and efferent blood and lymph vessels. The lymphatics emerge at various points along its surface and run to the regional glands, to neighboring trunks or plexuses. This arrangement leads to an important deduction. It has been observed in chronic pancreatitis associated with other visceral inflammations, that the pancreas is often not definitely affected, but that only a portion of it will show enlargement, induration, or nodulation. Thus, in gall-bladder disease, it is the head of the organ which participates most frequently, while the tail of the organ may entirely escape. If, now, the infection were duct-born it is difficult to understand why the gland should not be diffusely affected, the infection following the ramification of the ducts. If, however, the infection be carried by the lymphatics, it should be localized to the segment of the organ which is supplied by the lymphatics in communication with those carrying the infection. Thus, the irregular inflammatory swellings of the pancreas may be readily understood. It is conceded that this explanation implies that infection must stem

<sup>1</sup> Journal of the American Medical Association, 1913, vol. lx, p. 1.

the ordinary current of the lymph flow in order to gain access to the organ, but this is by no means an infrequent observation in other portions of the body, and need occasion no surprise here. Retrograde metastasis is a well-recognized occurrence."

Deaver regards this lymphatic infection of the pancreas as a fore-runner of serious changes in the gland. The treatment is always operative.

Last year (page 132) I was much interested in Weichselbaum's paper on the *association between chronic pancreatitis and alcohol*. Lissauer<sup>1</sup> has followed up this work on 24 cases, all of whom had been addicted to alcohol, but none of whom had had any evidence of hepatic cirrhosis. An important point is brought out by Lissauer, to wit: that macroscopically there was no disease of the pancreas ascertainable. This finding is vital and should not be lost sight of by surgeons, who claim to be able, at the time of operation, to diagnose a chronic pancreatitis from the feel alone. The latter varies with the time of digestion, be it remembered. The organ weighed between 52 and 208 grams (normal 90 to 120 grams), so that sometimes it was small and sometimes it was larger than normal.

On microscopic examination, the organ generally showed connective-tissue overgrowth, but in severe cases no change was evident. Weichselbaum found but two organs which showed no change in structure, so Lissauer's cases were more numerous than the former's. A very common finding was fatty infiltration of the parenchyma, being so marked that in some cases the nuclei were hidden in fat droplets. The islands of Langerhans were involved in this infiltration. So marked is the change in the pancreas, and so common are the pancreatic changes in alcoholism that Lissauer, following Friedreich's lead, suggests that the condition be spoken of as an alcoholic pancreas (*Säuferpankreas*). He hints at the relationship between a chronic alcoholism and diabetes, which has long been known to exist, being explained on the basis of a chronic alcoholic pancreatitis.

Two papers dealing with the *clinical side of chronic pancreatitis* as opposed to the purely laboratory aspect have been written by Schmidt<sup>2</sup> and by Gross.<sup>3</sup> Schmidt describes the clinical picture of three cases of pancreatitis whose symptomatology was so nearly alike that one might be inclined to speak of a symptom-complex. The latter comprised gastro-intestinal symptoms, diarrhea, vomiting, epigastric oppression, pain on pressure in the upper abdomen, and loss of weight. The most valuable means at hand for diagnosing the condition is, according to Schmidt, the examination of the feces, especially after a test diet. I agree with Schmidt that the test diet is of value, but I

<sup>1</sup> *Deutsch. med. Woch.*, 1912, p. 1972.

<sup>2</sup> *Mitt. a. d. Grenzgeb.*, 1913, vol. xxvi, p. 9.

<sup>3</sup> *Deutsch. Arch. f. klin. Med.*, 1912, vol. cviii, p. 106.

believe one should never neglect the examination of the stools of an ordinary mixed diet. This should always precede the test diet.

The feces are generally more voluminous than normal and are covered with a thin coat, greasy in appearance, consisting essentially of fatty acids and neutral fat. The meat fibers are no longer recognizable macroscopically, but under the microscope the striated structure is readily seen. Undigested starch granules are a common feature. Schmidt claims that in mild cases of pancreatitis, the stools, even after a test diet may not be changed over the stools in normal individuals, and he recommends in these cases, to add butter or finely chopped raw ham to the diet. In some cases, the fat digestion is more greatly disturbed, in some, the meat, and in some the starch, but in no case do the three run parallel. It is just this point, to my mind, which makes the diagnosis so difficult. It is conceivable that the trypsin may be normal in amount and in splitting power, whereas the amylase is deficient, therefore any test which relies on the detection of one of the pancreatic ferments alone, is apt to be a great source of error.

As a result of the imperfect utilization of the food, loss of weight and emaciation is a prominent feature, although by no means a constant characteristic. Schmidt claims the former must be held accountable for the intercurrent gastro-enteritis, and he blames the countless undigested meat fibres as being an incubator for putrefactive bacteria. Although pancreatitis commonly follows gall-bladder disease, Schmidt believes that anomalies of bile secretion are rarely a consequence of pancreatic inflammation. He calls attention to the fact that peritoneal disturbances of the pancreas lead to more digestive troubles than organic disease (tumor, etc.), as the latter is more apt to be localized and less apt to involve the whole parenchyma, as does a chronic inflammation. The so-called specific tests for pancreatic disease, Schmidt places on a plane far inferior to the result furnished by a thorough stool examination.

So far as prognosis is concerned we know little, but upon a primary cause can be found. The course of the disease depends principally on just what measures can be used to combat this. Occasionally the pancreatitis subsides of itself as in a case of Schmidt's.

I recommend the reader to Gross' article for the report of clinical and laboratory work on two cases of undoubted pancreatitis. Various trusty (?) laboratory tests were tried, and in addition quantitative studies of fat and protein metabolism. Of practical value is the statement that the commercial pancreatic preparations in nowise affected the clinical course or the metabolic processes, and one must deduce that these preparations, especially pankreon, of which so much was expected, are valueless, at least at the present time.

**Functional Tests of Pancreatic Insufficiency.** The best paper I have seen on the subject is by Frank.<sup>1</sup> Its purpose is disclosed by the title,

<sup>1</sup> Arch. f. Verdauungskr., 1912, vol. xviii, p. 121.

“The value of the methods for diagnosing functional disease of the pancreas.” The author has done a great amount of work on the literature, and has read the several articles with an impartial mind. His conclusions are reached only after the researches of others have been carefully studied, and having no personal axe to grind in the shape of a test of his own, his judgment is unbiased. Frank’s paper is a large one, extending over seventy pages, and is a valuable résumé of the whole subject. He has chosen to divide the tests into groups according to the way in which they are supposed to detect pancreatic insufficiency.

Group one includes the Sahli glutoid capsule, Schmidt nucleus test, the Ferreira test, and the Winternitz test. The *Sahli test* is unhesitatingly condemned, while the Schmidt test is held *sub judice*. Kahiwado’s modification, which I described last year, seems to have saved the test from falling into oblivion, but it is doubtful if even this improvement will alter Frank’s opinion that the nucleus test has so little value that it is hardly worth considering. The *Ferreira test*, which consists of giving a glucoside—salicin—which is split up by the pancreatic juice, liberating salicylic acid (tested for in urine), has so many objections attached to it that it is hardly reliable, and no one has, to date, made any further studies on it. The *Winternitz test* (administration of ethyl ester of monoiodo-behenolic acid and testing the urine for iodine), although extolled by Winternitz, has received no substantiation.

The second group, which comprises those methods devised for detecting ferments in the feces, includes the *serum plate test*, the *trypsin determination*, by the various methods, the *diastase* and *lipase estimations*. As regards the first, when certain precautions are observed, Frank believes that it has some value, for instance, only when after repeated examinations, having recourse to purgatives, maybe, when antitrypsin is not present, only then if there is no digestion of the serum plate, can a disturbance of trypsin secretion be diagnosed. These precautions, of course, rob the method of general clinical application. Most of the *tests for trypsin* depend on the digestion of casein which is shown by Frank to be digested equally by erepsin and trypsin, a fact which deprives such tests of any significance. The examination of the feces for diastase is of doubtful value, but the examination of the urine for this ferment, according to Wohlgemuth’s method, seems to promise much. As far as the *lipase* is concerned, the method is very cumbersome, and besides, it is believed that the intestinal juice itself contains lipase. At all events there is no reason to believe its detection has any more value than the finding of diastase.

In the third group, Frank places the *oil test meal*, and regards the latter as a very valuable acquisition to our diagnostic aids. It enables us to diagnose not only a complete pancreatic achylia, but if the cases are frequently studied, it has a quantitative value, giving us information as to the degree of the ferment secretion.

The fourth group of papers critically reviewed is that containing references to the *obtaining*, direct, of the *pancreatic juice by means of the duodenal tube*. So far as methods are concerned, Frank seems to favor the Einhorn.

So far as the *Cammidge test* is concerned, the author believes that it has some value, but is by no means specific of pancreatitis, being found in many other diseases and in health. It may be regarded as an aid to diagnosis, and, when taken in connection with other facts, is of some use.

To classify the various tests in a more compact manner, preference is given first to the *duodenal tube method*, and next to the *oil test meal*. Examination for ferments in the feces is doubtfully valuable, and the results obtained must be minutely scrutinized. All other methods are of questionable use. The employment of many tests of course is to be recommended.

**Ferment Analyses of the Duodenal Contents and of the Stools.** Using the customary duodenal tube in the usual way, Crohn<sup>1</sup> made a study of the duodenal contents for amylase, lipase, and protease. Similar studies were also made on the feces. Dr. Crohn is to be complimented on the very clear and very concise description of his technique, as one is able to get at the essentials without a too protracted journey through pages of irrelevant matter.

In health, the pancreatic ferments show fluctuations of strength from day to day even under the same conditions, and at times there was an absence of amylase or lipase. The protease is the most constant ferment and is always present when the pancreatic duct is open. Erepsin, by the way, despite the contentions of others, does not seem to interfere with the test.

In a case of acute pancreatitis, there was a marked diminution in the activity of the pancreatic ferments, and in a case of sarcoma of the duodenum, the ferments were absent from the duodenum and from the stool. These two cases came to autopsy, where the true diagnosis was definitely and satisfactorily made.

Crohn believes that the examination of the duodenal contents for pancreatic ferments is a reliable method for determining the patency of the ducts of the gland, although he admits that much more work will have to be done before accurate conclusions can be derived.

**TRYPSIN.** In view of the critique of Frank on the value of casein as a test for trypsin digestion, the paper by Orlowski<sup>2</sup> loses importance. To anyone anxious to review briefly the one hundred and nineteen papers on the subject, Orlowski's paper is recommended. There is a very complete and large table of eighty-seven original cases, carefully arranged and easy of study.

<sup>1</sup> American Journal of the Medical Sciences, 1913, vol. cxlv, p. 393.

<sup>2</sup> Zeitschr. f. klin. Med., 1912, vol. lxxvi, p. 460.

CAMMIDGE TEST. This test which has indeed suffered "the slings and arrows of outrageous fortune" has been studied anew by Mayesima,<sup>1</sup> of Kyoto, Japan, to the end that the test is worthless. He found the crystals to be far from uniform in their chemico-physical constitution, and therefore states that the mother substance of the osazone crystals cannot be the same in each instance. Analysis of the crystals shows them to be but the normal paired glycuronic acid in the majority of cases, and Mayesima claims that this substance is not removed by tri-basic lead acetate as Cammidge, it will be remembered, declared. It is probable that pentosan may be held responsible for the crystals, which are certainly not made up of a phenyl hydrazin lead salt compound, nor do they consist of glucosazon.

An article written in 1909, and published in 1913, is the strange offering of Karas,<sup>2</sup> of Russia. Why it should be published at this late date is not stated by the editors of the admirable *Zeitschrift*, nor is any explanation forthcoming from the Russian author. Its tenor is favorable, however, and the last sentence states, "The Cammidge reaction is an important argument for pancreatic disease."

Langer,<sup>3</sup> although he has found typical crystals in normal individuals after giving them 100 grams glucose, believes the reaction is not dependent on sugar alone, as true crystals were obtained even when glucose was destroyed (boiling with 20 per cent. potassium hydrate solution). A curious fact was brought out in Langer's work, namely, that if glycosuria is present after giving 100 grams of glucose, no reaction appears. If there has been already glycosuria, pancreatic cases give a negative test, but when 100 grams of sugar are given, the test becomes positive, whereas in healthy individuals, when alimentary glycosuria appears, the test is negative. Langer believes the end result depends on some form of sugar arising from the formation and utilization of glycogen. In adrenalin glycosuria, the test is positive, and he believes the chromaffin system is involved to a certain extent in the reaction.

EHRMANN'S TEST. The best proof that there is no reliable test for pancreatic inefficiency, is offered by the reading of articles purporting to have discovered a new method. Ehrmann<sup>4</sup> bases his latest test on the principle that the pancreatic juice can split neutral fat into fatty acid which may then be isolated as the copper salt. The test meal which contains palmin, is made as follows: 30 grams of ordinary rice starch are dissolved in 250 c.c. of water and slightly warmed. A little salt may be added for seasoning. To this mixture, 75 grams of warmed palmin are added, and, after remaining in the stomach for two and a half hours, the gastric contents are extracted.

<sup>1</sup> Mitt. a. d. Grenzgeb. d. Med. u. Chir., 1912, vol. xxv, p. 403.

<sup>2</sup> Zeitschr. f. klin. Med., vol. lxxvii, p. 125.

<sup>3</sup> Wien. klin. Woch., 1913, p. 331.

<sup>4</sup> Berl. klin. Woch., 1912, p. 1363.

Two solutions are required for the reaction:

## SOLUTION 1

Æther petrolei . . . . .	90
Benzoli . . . . .	ad 100

## SOLUTION 2

Cupri acetici . . . . .	3
Aqua dest. . . . .	ad 100

A portion of the extracted contents is placed in a test-tube with equal part of solution 1 and thoroughly shaken, after which the ethereal extract which is found on top is put in a second test-tube with equal parts of solution 2, and thoroughly agitated. The ethereal layer will become more or less intensely green, depending on the amount of fatty acid present, whereas there is no splitting of the palmin due to sufficient pancreatic ferment, therefore this layer will be perfectly clear.

Ehrmann says that if there is much hydrochloric acid present the reaction may be weak or entirely absent, even when the pancreas is normal, and in these cases it is recommended to repeat the test with a test meal to which a teaspoonful of sodium bicarbonate has been added.

This test has been studied by Wertheimer<sup>1</sup> working in the same laboratory where Ehrmann conducted his researches, so the work cannot be regarded as without bias. Wertheimer was able to show that no other ferment in the gastro-intestinal tract was able to split palmin, and he believes that the test is applicable to clinical uses. He describes a quantitative method, but does not state what advantage is to be derived therefrom.

SCHMIDT'S NUCLEUS TEST. This test which, like Antaeus of old, seems to receive new strength the more often it is thrown to earth, arises again in the hands of Fronzig.<sup>2</sup> The latter believes it is theoretically well-founded and fails to find any experimental proof that aught save the pancreatin of the pancreatic juice is able to digest cell nuclei. It is refreshing to see a substantiation of Schmidt's test from someone not working directly under Schmidt's tutelage. Most of the favorable criticisms of the test have been heretofore offered by Schmidt and his school.

**Fat Necrosis.** The great amount of work which has been done on fat necrosis in the last two decades has been productive of this fact, that, in order to bring about fat necrosis, there must be an activation of pancreatic juice by the entrance of duodenal contents in the pancreatic duct, and that this activation, plus a mechanical or bacterial injury to the pancreatic cells, is responsible for the resulting necrosis. So much

<sup>1</sup> Zeitschr. f. klin. Med., 1912, vol. lxxvi, p. 57.

<sup>2</sup> Ibid., 1913, vol. lxxvii, p. 40.

for the actual cause of the fat necrosis. What is the explanation of the severe subjective and objective symptoms which follow? Various views have been offered, namely, that the symptoms are a result of a soap intoxication due to absorption of the soaps present in the necrosis; that the symptomatology is aroused by a general intoxication by the juice of the necrotic pancreas. Guleke and Bergmann's view is, that the toxic agent is not identical with the pancreatic juice but is very closely related to it. An important fact brought forward by these last-named authors is, that dogs may be immunized, so to speak, against fat necrosis by a previous injection of commercial trypsin.

Joseph and Pringsheim<sup>1</sup> have made this important observation the basis of a communication in which that particular phase was closely studied. They were able to confirm Guleke and Bergmann's findings, and arrive at the conclusion that the immunizing dose is quantitative, that is, that a certain amount of trypsin immunizes against a certain amount of pancreatic juice introduced subperitoneally. Inasmuch as the trypsin treatment cannot be used to immunize animals passively, its application to man does not seem to be a matter of the near future. Its academic value can hardly be underestimated, however.

**Diabetes and the Pancreas.** An unusual cause of diabetes is pressure on the pancreatic duct by a dilated intestine. Busch<sup>2</sup> has reported two cases of fatal diabetes, the one from pressure on the pancreatic duct by scybalous masses, the other by a dilated and gas-distended bowel.

**Cysts of the Pancreas.** The correct diagnosis of pancreatic cyst before operation was made by Gursenbauer, in 1882, according to Decker.<sup>3</sup> The condition is met with between the thirtieth and fiftieth year, and either sex may be afflicted, although the disease is rarely seen in children. Clinically, pancreatic cysts are classed as true and false, or pseudocysts, the true cyst lying in the pancreatic tissue itself, the false being found in the bursa omentalis and containing blood and pancreatic juice.

Pathologists distinguish four forms: (1) Proliferative or cyst adenoma. (2) Retention cyst. (3) Degeneration cyst. (4) Pseudocyst.

1. This first class of cysts comprises true new growths, and usually there is a main cyst and numerous smaller ones. According to Lazarus, the majority of the proliferative cysts arise in the tail of the pancreas.

2. These arise from a malposition of the pancreatic duct so that there is obstruction to the flow of pancreatic juice. This type of cysts is very rare.

3. Degeneration cysts occur in the course of acute diseases, such as typhoid, septicemia, and in the malignant degeneration of the pancreas. The cyst is made up of degenerated pancreatic tissue.

<sup>1</sup> Mitt. a. d. Grenzgeb., 1913, vol. xxvi, p. 290.

<sup>2</sup> Virchow's Archiv, vols. cxi and cexii.

<sup>3</sup> Med. Klin., 1912, p. 1827.

4. Pseudocysts occur more frequently than any form of cysts. The false cysts have no true wall of their own, and are walled off by the peritoneal coat of the omental bursa.

Approximately three-fourths of all cysts are traumatic in origin, and the other fourth neoplastic. The content is generally a slimy, sticky, dark-brown fluid, consisting of albumin, cellular detritus, and fat particles. Ferments are present, but not all three together, and the detection of any one of the pancreatic ferments is diagnostic although the absence does not deny the existence of a cyst. A peculiarity of the cysts is the sudden disappearance due to rupture.

*Symptomatology.* The first symptoms are loss of appetite, nausea, and vomiting. The gastric distress is due to pressure on the stomach by the cyst, which lies between the cyst and the transverse colon. Loss of weight, and even emaciation, may result early. Colic-like pains, from pressure on the celiac plexus, are distressing features, and in their absence, a feeling of pressure, tension, and heaviness in the left hypochondrium is complained of. When the tumor grows large enough, it is felt as a round, tense, fluctuating mass, and when it becomes of great size, pressure on the diaphragm may cause dyspnea of marked degree. If there is pressure on the common duct, jaundice is seen. Glycosuria, fat stools, and the usual pancreatic tests are all absent.

Decker discusses the differential diagnosis, and reports three cases, two of which were correctly diagnosed before operation, although all three were pseudocysts, and not the true variety. In none of the three was there a history of trauma. Operation was eminently successful in all.

A case of traumatic cyst, apparently a pseudocyst, is reported by Isaacs.<sup>1</sup>

Schlessinger<sup>2</sup> extols the use of the *x*-ray in the diagnosis, urging the employment of contrast pictures with air and bismuth. Two cases are reported by Cholmeley<sup>3</sup> and the like number by Frankan.<sup>4</sup>

<sup>1</sup> Medical Record, 1912, vol. lxxxi, p. 1230.

<sup>2</sup> Med. Klin., 1912, p. 1027.

<sup>3</sup> British Medical Journal, 1913, vol. i, p. 518.

<sup>4</sup> Ibid., p. 519.



## DISEASES OF THE KIDNEYS.

BY JOHN ROSE BRADFORD, M.D.

**Orthostatic Albuminuria.** The uncertainty as to the *pathology* of orthostatic albuminuria is shown by the diversity of opinions held with reference to its nature by authors who have worked at this subject, and it would seem probable that no single explanation is applicable to all cases. Some have regarded the condition as essentially of renal origin, and this view has derived support from the fact that during the subsidence of certain forms of undoubted acute nephritis there is a period when the albuminuria, before it entirely disappears, assumes the orthostatic characters. Others have regarded the condition as due to the presence of some anomalous protein substance, and have from time to time insisted on there being some constant difference in the nature of the protein excreted in these cases and that found in the urine in cases of undoubted renal disease. Others, again, have looked upon the albuminuria as due to some venous congestion dependent upon some interference with the return of venous blood from the kidney in the upright posture, due possibly to some malformation, or, in some instances, to the existence of movable kidney. To this mechanical view there is of course the grave objection that it fails to explain the diurnal variation in the albuminuria, and also the fact that, in most cases, if not in all, the condition is a temporary one, occurring only for a limited period during adolescence. Others, again, have regarded the albuminuria as due to circulatory disturbance in the kidney dependent on functional disturbances of the general circulation, these being associated it may be with vasmotor anomalies, or with cardiac irregularities of a more or less trivial, temporary, and unimportant character.

The *influence of posture* in the albuminuria has seemed to many to indicate that the condition is most probably associated with some disturbance of the complicated vasmotor reflexes that normally occur on change of posture from the horizontal to the vertical, although it must be admitted that it is difficult, on this hypothesis, to explain the disappearance of the albumin in the late afternoon while the erect posture is still maintained. The theory of the cardiac and vasmotor origin of the albuminuria has received much support from the fact that many of the albuminurias present distinct signs and symptoms of some disturbance of the general circulation; thus many of them complain of palpitation, faintness, shortness of breath on exertion, cold extremities, lividity, etc.

Bass and Wessler<sup>1</sup> have studied the *relationship of orthostatic albuminuria to the cardiovascular system* in the material supplied by a large pediatric clinic. They draw attention to the classification of these cases adopted by Langstein, who recognized three separate groups of cases of orthostatic albuminuria: First, the *angiospastic type*, pale rapidly growing children, complaining of fatigue, palpitation, and headache, but not anemic and having a normal quantity of hemoglobin; a second or *erethic group*, with marked vascular irritability, flushing easily, and liable to headache, vomiting attacks, and urticaria. A third group also exists in which no signs or symptoms are present but in which the albuminuria is discovered, as it were, accidentally, in the course of a routine examination.

Bass and Wessler consider that when symptoms are present in cases of orthostatic albuminuria, they are chiefly those referable to the cardiovascular system, and that the most constant and prominent symptoms are dyspnea on exertion, palpitation, precordial pain, headache, fainting, and an increased susceptibility to cold. These authors give the results of the examination of thirty-six cases in which an orthostatic albuminuria was discovered in the course of an examination carried out to elucidate a variety of symptoms complained of. In each case the albumin was shown to be present by the heat and acetic acid test, and its orthostatic character proved by the fact that it was not present in the morning urine and that it disappeared when the horizontal position was assumed, and, finally, no casts were found in any case although the urine was centrifuged for this purpose.

A complete physical examination was made, and, in addition, the size of the heart was determined by orthodiagraphy in the sitting posture. The child was then made to run up and down four flights of stairs, and a second determination made of the size of the heart; the pulse-rate was also noted both before and after the exercise.

The results of the examination of the size of the heart at rest were as follows: In seven cases the heart was seen to be larger than normal, but in only one case was the enlargement distinct, in the other six it was so small as to be within the limits of error. In twenty-two cases, the size of the heart was distinctly less than normal, and the authors point out that the difference was perfectly distinct and appreciable. All the cases of orthostatic albuminuria were examined and no selection, based on the presence or absence of cardiac symptoms, was made. In fifteen cases, either symptoms or physical signs of cardiac abnormality were present, and a study of these fifteen cases shows that in none of them was there any enlargement of the heart. In two of them, an increase above the normal of from 2 to 3 mm. was present, but this also is well within the limits of observational error. In nine cases, however, the heart was distinctly small, and in one case it was less than the normal

<sup>1</sup> Archives of Internal Medicine, vol. ii, No. 4.

size by as much as 22 mm. In four cases, the physical signs pointed to distinct enlargement, thus the apex beat was outside the nipple line, and percussion revealed slight enlargement to the left, but this enlargement was shown in only one out of the four by the orthodiograph. Notwithstanding the absence of definite cardiac enlargement, all these children had symptoms, such as dyspnea on exertion, palpitation, and sometimes precordial pain. Further, distinct physical signs were often present; thus the authors note that, in five cases, the first sound was of a booming character; in three, apical systolic murmurs were present; four had marked accentuation of the pulmonary second sound, four showed signs of marked overaction, and in four there was an increase in the area of cardiac dulness to the left. These physical signs and symptoms, in cases of orthostatic albuminuria, have been attributed by other observers to weakness of the heart walls and consequent dilatation, but Bass and Wessler consider that their orthodiagnostic results show that at any rate in orthostatic albuminuria the so-called "dilatation weakness" is not due to actual enlargement of the heart.

Further, these authors do not consider that the symptoms are to be attributed to the small size of the heart, since the smallest hearts were found in this series of cases of orthostatic albuminuria in the cases in which the children did not present any cardiovascular symptoms at all. These authors having ascertained that the hearts of these patients were either normal or less than normal in size, proceeded to make observations on the effect of exercise on the size of the heart. It would seem, from recent observations, that the normal heart does not undergo enlargement as the result of severe exercise, but rather that it undergoes some diminution in size, and, in some instances, it may contract considerably in volume. Some observers have stated that, in cases of orthostatic albuminuria, the heart sometimes increased in volume as a result of exercise, but these determinations were made by percussion methods only, and these are open to error.

Bass and Wessler state that they have been unable to find any records of the examination of such cases by orthodiagnostic methods, and hence carried out their series of observations on the transverse diameter of the heart in thirty-five cases before and after exercise. In twenty-two cases, the heart became distinctly smaller, and in the remainder the size of the heart remained practically unchanged, and in no case did the heart become larger after exercise, although some of the children, as already stated, presented subjective and objective cardiac symptoms. The authors therefore consider that the cardiac symptoms seen in some cases of orthostatic albuminuria cannot be primarily of cardiac origin, and that it is more probable that they are of vasomotor origin. It is possible, however, that the failure of the heart to diminish in size in a certain number of these cases, is dependent upon some abnormal cardiac response as it is such a characteristic phenomenon of the normal heart.

to diminish in size after exertion. It would seem, moreover, that there is a marked discordance between the conclusions to be drawn from the physical examination of the heart by the older methods, *e. g.*, percussion, and those obtained from a study of the orthodiagnostic results. This is a matter of considerably wider importance than the mere interpretation of the nature and mode of origin of orthostatic albuminuria.

Most clinicians have looked upon displacement of the heart's apex beat and enlargement of the area of percussion dulness not only as clear evidence of cardiac enlargement, but often as evidence of the presence of organic cardiac disease, and have therefore regarded cases in which an orthostatic albuminuria was accompanied by such cardiac physical signs as probably cases of definite and possibly progressive renal disease.

It would certainly seem, from the work of these authors, that not only may such signs be present in cases of undoubted orthostatic albuminuria, but, further, that such signs must not be regarded as evidence of cardiac enlargement, since apparently, in such cases, the heart may actually be seen to be smaller than normal. In three cases in this series a condition known as the juvenile heart was present; in these, there was distinct hypertrophy of the left side without any evident cause for it, such as nephritis or valvular disease. Some authors consider that this form of cardiac enlargement is not uncommon about the age of puberty and it is probable that the heart condition is a transitory one, and related to a disproportionate rate of growth of the heart on the one hand and the body generally on the other.

Lastly, in about 30 per cent. of the cases, these authors found the heart to be of the type known as the "drop heart," a condition in which the heart assumes a more mesial position in the chest and the apex is rather lower than normal, the organ as a whole is more vertical than is normally the case. This position of the heart is often seen in narrow-chested individuals with neurasthenia, and often in those constitutionally weak, and hence it is of interest that it should also occur so frequently in those suffering from orthostatic albuminuria.

**Effects of Venous Congestion of the Kidneys.** Rowntree, Fitz, and Geraghty<sup>1</sup> have carried out a series of experiments on the *effects following the experimental production of varying degrees of venous congestion of the kidney* with the object of throwing light on cases of the cardiorenal type so often seen clinically where it is so difficult to determine to what extent the heart and kidney are respectively affected. In such cases, it is often most difficult to determine whether the renal phenomena are due to mere passive engorgement resulting from a cardiac lesion, or whether the kidneys are primarily affected with nephritis and the cardiac condition is merely secondary to this. Successful treatment can scarcely be carried out unless this question is correctly answered, and the prognosis obviously depends very largely upon the question whether

nephritis is present or not. In addition, there are the further questions as to the degree of impairment of the renal functions that may result from congestion alone, and also whether renal engagement is capable, if long continued, of causing further progressive and organic kidney disease.

Former observers have shown that varying degrees of obstruction of the renal vein are capable of producing albuminuria, hematuria, and the presence of epithelial cells and of epithelial casts in the urine. There has been some difference of opinion as to the presence of casts, some observers have denied their appearance in simple congestion, and regard their appearance as indicative of nephritis, but the majority, however, are of the opinion that casts are present in congestion if this is at all serious in amount.

Congestion of the kidney was produced by these authors experimentally by means of encircling either the renal vein, or the vena cava inferior above the renal veins, with a constricting band, the degree of obstruction produced being capable of variation in different experiments. The degree of congestion produced in the kidney could also be controlled to some extent by ligaturing or not the vessels that maintain the collateral circulation after destruction of the renal vein had been produced.

The functional activity of the kidney was tested by the injection of phenolsulphonephthalein, and also to some extent by the injection of lactose and potassium iodide. The phthalein test, however, was the most satisfactory as giving the clearest indication of the degree of impairment, if any, of the activity of the kidney. The urine was obtained by catheter one hour and ten minutes after the injection of the phthalein into the lumbar muscles, and the amount of the drug present in the total quantity of urine obtained determined by a colorimetric method. The authors determined, by other experiments, that in normal dogs 50 per cent. of the injected drug was recoverable in this period.

The results obtained by these workers varied, of course, with the degree of obstruction to the venous circulation produced experimentally. When the experimental, passive congestion is slight, the quantity of urine passed is normal in amount, but it contains a small amount of albumin, together with occasional hyaline and granular casts, and sometimes there was slight hematuria. The functional activity of the kidney is but little altered, and phthalein, sodium chloride, and potassium iodide are all excreted normally, but there may be some delay in the excretion of lactose. When the passive congestion is more marked, the urine is diminished in amount, but a fair quantity is still passed, albumin and casts are more abundant, and blood is frequently present. On the other hand, the authors consider that the total excretory capacity of the kidney is not markedly decreased, although the

excretion of salt is somewhat diminished and the excretion of lactose is invariably delayed, yet that of phthalein remains usually normal. Marked experimental, passive congestion leads to the excretion of very scanty amounts of urine, with large quantities of albumin, casts, and blood; the functional activity of the kidney is greatly reduced, as shown by the delay in the excretion of phthalein, salt, and lactose.

The authors consider the lactose test the most delicate for revealing the presence of some interference in the activity of the kidney, such as is produced by passive congestion, but that it is not a reliable test for determining the degree of impairment present. Marked delay in the excretion of lactose has been seen when the animals were in good condition and where they remained in good condition, but delay in the excretion of phthalein has always been associated with the development of symptoms, and they therefore consider the phthalein test one of great prognostic significance.

The rate of excretion of potassium iodide is a very uncertain guide; although its excretion is usually prolonged in passive congestion of the kidney, yet the time is so variable that the test is of no great value. One of the most interesting results obtained is that partial obstruction of the venous return is not invariably associated with a decreased urinary secretion; thus, when one renal vein is partially occluded, more urine is sometimes secreted from the congested kidney than from its normal fellow, but the urine secreted by the normal kidney is more concentrated. Another interesting result is that when the obstruction to the venous return through the renal vein is slowly progressive, the collateral circulation may develop to an extent sufficient to allow of an efficient renal function even when the renal vein is completely occluded, so that the return of blood from the kidney is effected entirely by collateral channels. Lastly, it would seem, from these authors' results, that chronic passive congestion may be produced and exist for a long time without the development of any chronic nephritis. In one case there was a considerable increase of fibrous tissue suggestive of chronic nephritis, but the authors hesitate to regard this nephritis as dependent on the passive congestion. These experimental results are very definite and cannot fail to be of service in attempting to unravel the complex clinical phenomena so often seen in cases of cardiorenal disease.

**Obstruction of the Renal Circulation.** Ghoreyeb<sup>1</sup> attacks the problem of *the mechanical obstruction to the circulation in the kidney produced as a result of nephritis*. In renal disease, many observers have thought at different times that the local changes in the kidney, such as the destruction of large areas of kidney tissue, the changes in the arteries of the kidney, and other lesions, must be important factors in the production of the widespread cardiovascular changes that are such a prominent

<sup>1</sup> Journal of Experimental Medicine, vol. xviii, No. 1.

feature of so many forms of kidney disease. This question is capable of being investigated from an experimental standpoint, and Ghoreyeb has dealt with one aspect of it, *i. e.*, the question as to whether, in the toxic nephritis produced experimentally, there is any impediment to the passage of blood through the affected kidney.

The method adopted was a perfusion one and the rate of flow was determined by the measurement of the quantity of fluid flowing out of the renal vein in a given time. Some difficulty was experienced in selecting a suitable perfusion fluid, as many of the perfusion fluids used in the laboratory tend to produce edema in the organ perfused and thus the result is vitiated. The author finally selected the serum of the animal experimented on, *i. e.*, the rabbit, as being the one least open to objection, provided it was collected aseptically, and kept in the ice chest, and that it was filtered through eight layers of gauze before use. The following controls were used, when a renal lesion had been produced by a drug, the serum used for perfusion was obtained both from normal rabbits and also from rabbits in which the kidney lesion had been produced by the injection of the drug in question, and, finally, a normal kidney was perfused with a serum containing the toxic substance, *e. g.*, cantharidin, since the nephritis produced by cantharidin is the one in which the greatest impediment to the circulation is found to be present. The rate of flow through a normal kidney is the same whether the perfusion be carried out with normal serum, or with serum obtained from a rabbit in which a renal lesion has been produced by the injection of cantharidin. The author therefore concludes that although nephrotoxic substances may be present in the serum of animals with experimental nephritis, they have little immediate effect on the blood flow through a normal kidney.

The renal lesions were produced with uranium nitrate, potassium arsenate, potassium chromate, cantharidin, or diphtheria toxin. With cantharidin, the following lesions were found in the kidney: the blood-vessels of the glomeruli showed a diminution in caliber owing to the swelling and proliferation of the lining endothelial cells, and there were many leukocytes in the capillaries. In the tubules, the epithelium was markedly swollen, and this caused much narrowing of the intertubular spaces. With uranium nitrate, the glomerular lesions are markedly different, the only change present being a slight swelling of the capillary endothelium. In the tubules, however, epithelial degeneration is very marked and there was much desquamation and necrosis. With potassium chromate, the glomerular lesions are somewhat similar to those seen with cantharidin; there is obstruction in the capillaries due to the accumulation of cells and endothelial proliferation, but the degenerative changes in the tubules are not so marked as when there is only swelling with but little necrosis. Potassium arsenate produces swelling of the endothelial lining of the glomeruli. With diphtheria toxin, the

lesions affect the tubules especially, the epithelium being swollen, granular, and vacuolated. In places, the normal epithelium is replaced by granular masses entirely filling the tubules, there is also a considerable amount of interstitial edema, but the glomeruli present but little change.

The general result of the experiments was to show that in all cases where a renal lesion had been produced by these toxic agents, there was some impediment to the circulation through the renal vessels, and that this was dependent upon the swelling of the epithelium and the changes in the glomeruli. Further, the circulatory impediment was most marked where the histological changes were most marked, and more especially where the toxin had caused swelling of the cells rather than necrosis. Both the circulatory impediment and the renal lesions are most marked some forty-eight hours after the injection of the toxin, and with the doses used there was a gradual return to the normal subsequently to this. Thus Ghoreyeb's results are of especial value in throwing light on the vascular changes accompanying acute nephritis, rather than as dealing with the vascular problems arising as a sequel to destruction of the kidney by chronic processes where ultimately the available kidney substance is but a fraction of the normal amount. The main interest of them probably lies in the demonstration that lesions affecting the epithelium and glomeruli are capable of rapidly causing a very definite and appreciable interference with the efficiency of the renal blood flow.

**Renal Function.** Rowntree and Fitz,<sup>1</sup> in a paper entitled *studies of renal function in renal, cardiorenal, and cardiac diseases*, detail an important series of observations on the results obtained by using a number of tests to estimate the degree of functional activity of the kidney in this group of affections.

These authors selected the following tests, the administration of phthalein, lactose, salt water, and potassium iodide; they also made determinations of the accumulation in the blood of so-called uncoagulable nitrogen, *i. e.*, the nitrogen of extractive matters, such as urea and its allies.

As the authors state, these tests were used with the following objects: (1) to estimate, if possible, the efficiency of the renal function in any given case; (2) to determine the value of these tests in the diagnosis to ascertain, in cardiorenal disease, if possible, which organ is most at fault, one of the most difficult problems of everyday practical medicine; (4) to ascertain whether the renal function is impaired in cases in which, clinically, the presence of nephritis is suspected and, lastly, to determine, if possible, whether the vascular or epithelial structures of the kidney were most at fault in any given case of renal disease.

The use of the phthalein test would seem to be especially valuable,

the drug is non-toxic and is excreted almost entirely by the kidney. In health, from 50 to 60 per cent. is recoverable from the urine within one hour of its intramuscular injection and from 60 to 80 per cent. in two hours. The dose used was 0.006 gm. injected intramuscularly in 1. c.c. of a sterile solution. The patient's bladder was emptied 1 hour and 10 minutes later and the determination made by a colorimetric process.

Lactose was injected in 2 gm. doses in 20 c.c. of water intravenously. This injection was sometimes followed by slight headache and malaise, and the normal excretion time is from four to five hours. Lactose is well excreted by the normal glomeruli, but it is probable that it may also be excreted by the tubular mechanism, and this is certainly the case when the glomerular apparatus is excluded as can be done, for instance, experimentally in the frog. In the present observations, the authors have regarded the excretion of lactose as an index of the activity of the vascular function of the kidney.

An excess of sodium chloride, when taken under normal conditions, is excreted by the tubules, but, as the authors point out, this excretion may be effected in one of two ways: If the salt be given without water, it is entirely excreted in twenty-four hours without any diuresis, and therefore the urine becomes more concentrated. If water be given in excess with the salt, then it is excreted partly by increased concentration and partly by diuresis. Where the vascular function of the kidney is impaired, the giving of a dose of salt may be followed by marked diuresis and the whole of the ingested salt excreted without the specific gravity of the urine being raised. Where a severe tubular lesion is present, a urine of low specific gravity is usually excreted and this is not raised by the administration of salt, nor is the amount of sodium chloride in the urine increased, since the tubules are unable to excrete it.

Potassium iodide is said to be excreted by the tubules, and although it appears in the urine rapidly after its administration by the mouth, even under normal conditions, sixty hours may elapse before its excretion is complete. The authors do not regard this test with much favor since some of their work shows that, in vascular congestion, its excretion may be delayed, and therefore that its use will not enable a discrimination to be made between passive congestion and passive congestion associated with nephritis.

As regards the value of the last test used by these observers, *i. e.*, the estimation of the extractive nitrogen in the blood, this would seem to be of considerable value. Thus Widal, who has done much work on this subject, holds the view that the prognosis depends largely on the percentage amount of its nitrogen in the blood, and that where more than 0.2 per cent. of urea is present in the blood, the duration of life can be measured by months and often only by weeks. The authors

consider that, normally, the uncoagulable nitrogen amounts to 0.5 to 0.6 gm. per liter, and that the urea is normally present to the extent of 0.3 to 0.5 gm. per liter of serum.

These authors have divided their cases into four groups: (1) Cases suspected on clinical grounds of suffering from nephritis. (2) Cases of mild nephritis without cardiac complications. (3) Cases of advanced nephritis without cardiac complications. (4) Cardiac cases with chronic passive congestion of the kidney, with or without nephritis. In group (1) an increased amount of sodium chloride is excreted normally with an increased concentration of the urine. Lactose and potassium iodide are excreted within normal limits, the excretion of phthalein is not decreased and the amount of extractive nitrogen in the blood is also within normal limits. In group (2), where nephritis is diagnosed on clinical grounds, such as increased blood pressure, slight cardiac hypertrophy, palpable vessels and possibly the presence of albumin and casts, the phthalein test shows that the functional activity of the kidney is usually slightly decreased. A delay in the lactose excretion suggests impairment of the vascular function, and this may be confirmed by the salt test, since with this a marked diuresis follows the administration of the salt but the total quantity ingested is excreted. The iodide excretion is usually normal, and there is little or no increase in the nitrogen content of the blood. In group (3), in which nephritis existed without cardiac inefficiency and therefore without any passive venous congestion, the lactose excretion was always delayed and the potassium iodide excretion was delayed in the most severe cases. The excretion of water was usually increased relatively or absolutely by the giving of sodium chloride, and in the most advanced cases the salt was constantly excreted in amounts less than the quantities ingested, and at the same time the concentration was low. The excretion of phthalein was constantly diminished and in cases in which uremia was present, it was excreted only in traces or not at all within a period of two hours after its injection. The nitrogen and the urea content of the blood were increased in the cases of the more severe type. The authors consider that in cases of nephritis these tests are of value, both from the point of view of diagnosis and also of prognosis, since the degree of impairment of renal function can be determined, and by repeating the phthalein test it can be ascertained whether the disease is progressing or subsiding. Further, where there is inability to excrete phthalein and lactose, and where sodium chloride and iodide of potassium are excreted with difficulty, death usually occurs within a short time. In group (4), in which chronic passive congestion was present, with or without nephritis, a correct opinion could only be formed by considering both the clinical symptoms and the results of the tests for functional activity. In most cases, the tests have to be repeated before a conclusion can be reached, since one series of functional tests is not sufficient to differentiate between passive congestion and nephritis.

In passive congestion, the excretion of lactose, iodide of potassium, and sodium chloride may be deficient, but the excretion of phthalein may be normal. If, however, the congestion is extreme, the excretion of phthalein may be decreased, but an improvement in the degree of passive congestion is accompanied by an increased excretion of phthalein and this precedes the increased excretion of sodium chloride and potassium iodide. If nephritis is present, the improvement in the circulation is not accompanied by any increase in the phthalein excretion, this remains low, whereas, if congestion alone is present, the phthalein excretion may rapidly return to the normal while there is still delay and imperfect excretion of the other test substances. In these cases, the nitrogen determinations may also be of value, since, although in passive congestion there may be an increase in the amount of extractive nitrogen in the blood, it does not increase to the same extent as it does in nephritis. The authors finally conclude that the functional activity of the kidney can be determined much more accurately by the use of these tests than by the ordinary clinical methods alone, and that the phthalein test is the one of greatest value, both from a diagnostic and a prognostic standpoint. The lactose test is also of diagnostic value in determining abnormal renal function and the suppression of the excretion of lactose may be of prognostic value, the sodium chloride test is by itself of little value but it is of considerable importance when considered in conjunction with the clinical facts. The potassium iodide test, however, is of little value either from a diagnostic or prognostic standpoint.

The marked accumulation of extractive nitrogen in the blood, when nephritis is present, is of considerable prognostic significance. No constant relationship between the quantity of urine passed and the condition of the patient has been found to exist, and, in cases in which cardiac complications were present, the amount of urine has been very variable and depends apparently on the degree of myocardial impairment and on the presence or absence of dropsy.

The specific gravity of the urine in cases in which the nephritis was advanced was persistently low and generally the cardiac cases have excreted a urine of higher specific gravity than the renal cases. The results of the administration of sodium chloride were somewhat variable, in advanced nephritis there was always some deficiency in the amount excreted but where nephritis coexisted with cardiac complications the results were very variable. In some cases retention occurred, and in others where possibly some extensive nephritis existed, as determined clinically and by the other tests, the amount of sodium chloride excreted was sometimes greater than that ingested. The authors therefore consider that the value of the salt test is very limited, but it is probable that in early or suspected cases, the lactose, iodide, and salt tests may be of value; whereas in cases of advanced nephritis, the phthalein test

and the determination of the quantity of extractive nitrogen in the blood are by far the more reliable methods of gauging the extent of the lesion present.

In connection with the work of these authors, a paper by Baetjer in the *Archives of Internal Medicine*, vol. xi, No. 6, on *Superpermeability in Nephritis* is of considerable interest inasmuch as he has made observations with the same series of functional tests in a group of four cases of parenchymatous nephritis of the chronic type. All four cases presented unequivocal evidence, clinically, of the presence of severe nephritis, with edema and marked albuminuria, and yet in all four the excretion of the usual test substances was above the normal limits. Facts of this order have been described in isolated cases of nephritis from time to time by other authors. Pepper and Austin described a case in which the phthalein excretion rose to 71 per cent. in 2 hours. In Baetjer's cases, the fluid balance, the elimination of lactose and of potassium iodide, and the percentage of extractive nitrogen in the blood serum were studied, in addition to the phthalein excretion. The general result was the same in all cases, that is to say, there was in each instance a condition of increased, rather than of diminished, renal permeability except so far as concerned the excretion of sodium chloride. In the case of sodium chloride there was an increased elimination of the salt after the ingestion of an excess, but this did not amount to more than from 30 to 50 per cent. of the quantity ingested, and in three out of the four cases, the ingestion of the salt was followed by an increase in the body weight, indicating the retention of fluid. In two of the author's cases, the phthalein excretion reached over 70 per cent. in the first hour, and in all four by the second hour it reached from 69 to 90 per cent. With lactose there was the same tendency to an increased rapidity of excretion. In the case of potassium iodide there was, in two cases, a definite delay in its excretion, together with an impaired excretion of salt.

Baetjer points out that his results are not to be regarded as throwing doubts on the value of these tests but rather to draw attention to the fact that certain functional tests may give normal results in the presence of serious renal lesions. These cases also have to emphasize the importance of determination of the sodium chloride excretion in cases where dropsy is present. Many observers have shown that in parenchymatous nephritis the functional tests may fail to reveal the extent of the renal lesion present, thus the elimination of methylene blue may be normal or even above normal, and French observers, especially Castaigne and Bernard, have drawn attention to the fact that, in parenchymatous nephritis with edema, the renal permeability may be normal or even increased, and that it is only in the later stages that it may become diminished.

Baetjer considers that his results indicate that a definite type of

nephritis may exist in which the kidney is more permeable than normal to some of the substances used as tests of functional activity, and that possibly such organs are also more permeable to serum albumin. He also considers that such cases may perhaps be more common than has hitherto been supposed, and possibly they may form a stage in the evolution of certain cases of nephritis. His results emphasize the importance of not relying upon a single test substance, but rather to employ a series of tests in estimating the functional activity in any given case. These results would seem to show that cases of parenchymatous nephritis stand somewhat apart in their response to functional tests not only from cases of other forms of renal disease unaccompanied by dropsy, but also apart from cases of continued renal and cardiac disease in which dropsy is often present. In other words, that it is not merely the question of dropsy that determines the difference in the response of these cases to these tests, but, rather, some condition of the kidney structures themselves. Rowntree and Fitz did not find any such cases of apparent increased permeability to phthalein in their extension series of cases although their series included several cases of chronic nephritis. This fact might perhaps be used as an argument in favor of this increased permeability being due rather to a stage in the course of the evolution of the chronic nephritis and therefore temporary in its duration, and possibly this stage is a comparatively early one.

**Nephritis.** The problem of the *relation of chronic to acute nephritis* would seem to be one capable of settlement by experimental methods, and more especially the question whether such chronic disease is the result of the continuous or repeated action of a toxin or toxins rather than the sequel of the nephritis produced by the action of a single dose of toxin. O'Hare<sup>1</sup> has conducted a series of experiments with the view of ascertaining whether a chronic nephritis is producible by the repeated injection of a chemical and a bacterial toxic agent. For this purpose he selected uranium nitrate and the *Bacillus coli communis*. This organism is well known as the causative agent in a number of renal infections, and it is sometimes the apparent cause of true nephritis. It would also seem as if cases are seen from time to time in which chronic nephritis is due to this cause.

O'Hare carried out his experiments on rabbits, but, out of a series of forty used, only eighteen survived long enough for it to be possible for a chronic lesion to develop, *i. e.*, periods varying from a few weeks to five months. In some cases, the uranium nitrate and the twenty-four-hour bouillon culture of the *Bacillus coli* were given simultaneously, the former subcutaneously and the latter intravenously; in others, the two toxic agents were given alternately at three-day intervals. The dose of uranium nitrate used varied from two to five milligrams, and 0.25 c.c. of the bouillon culture of the *Bacillus coli* was given at a dose.

<sup>1</sup> Archives of Internal Medicine, vol. xii, No. 1.

In twelve out of the eighteen rabbits there was a moderately marked increase of connective tissue in the kidney, in four a moderate increase, and in two a slight increase. In thirteen cases there was an increase of connective tissue in the outer cortex, and in two of these the increase was very marked. In seventeen cases there was an increase in the fibrous tissue at the junction between the cortex and the medulla, and in thirteen of these it was very marked. In fourteen cases there was an increase of fibrous tissue in the medulla, but in none of these was it very marked. The connective tissue was actually quite fibrous and in most of the kidneys it spread from the centre down the rays, forming scars containing distorted glomeruli. Lymphocytic infiltration was present in ten out of the eighteen cases, but was only well marked in three cases. Glomerular changes were well marked, thus, in ten cases, distinct drawing together of the glomeruli occurred as a result of the contraction of the fibrous tissue, and in five, there was dilatation of the capsule and shrinkage of the glomerular tuft. In twelve, there was distinct thickening of the wall of the capsule, and, in ten, there was also some thickening of the walls of the vessels in the tuft. In four cases there was some proliferation of the endothelial cells in the glomeruli. Only seven cases showed any dilatation of the renal tubules, and this was only well marked in two cases.

The author is of the opinion that the connective-tissue overgrowth was more dense in the series of rabbits treated with uranium and the injection of the *Bacillus coli* than in cases where uranium nitrate alone had been used. Although a lesion is thus producible by the action of these combined toxic agents that is comparable to that seen in man in cases of chronic nephritis, yet the author failed to produce, in his experiments, any of the arteriosclerotic vascular lesions that are so commonly found in man in association with chronic interstitial nephritis. He is convinced that, at any rate in twelve out of the eighteen cases, the lesions found in the rabbit are far in excess of any renal lesion occurring spontaneously in the rabbit, and that there can be no question that the nephritis was produced directly by the method employed.

**Retention of Foreign Protein by the Kidney.** Pearce,<sup>1</sup> in this interesting communication, deals with two problems: (1) whether a foreign protein tends to accumulate in the kidney, and (2) if so, is this tendency greater when nephritis is present. This problem, as Pearce points out, is of especial importance in the etiology of renal disease, or at least in the etiology of toxic nephritis, since toxins producing nephritis might conceivably do so as a result of a specific selective action on the part of the renal cells, these having an affinity for the particular toxin. On the other hand, the nephritis might be due to the result of irritation produced by the mere contact of the renal structures with the toxin during its elimination. The latter, of course, is the usual accepted view,

<sup>1</sup> *Journal of Experimental Medicine*, vol. xvi, No. 3.

but, as Pearce points out, it rests on no experimental basis. The fact that in certain forms of nephritis the glomeruli are mainly affected, and in others the tubules, has been regarded as evidence that the causative toxins were excreted in the one case by the glomeruli and in the other by the tubules, but it is of course possible that these toxins were respectively "fixed" by the different renal element.

Pearce has made use of the anaphylactic reaction in order to investigate this question, and has especially used egg-white as the foreign protein to be investigated. The egg-white was injected intravenously into rabbits, and these were killed in from one to four days after the injection. Extracts of the kidney were prepared and injected intraperitoneally into guinea-pigs; these guinea-pigs received, three weeks later, either an intraperitoneal or an intravenous injection of egg-white, and the presence or absence of an anaphylactic reaction was then noted. The results showed that the kidney extract contained egg-white twenty-four and forty-eight hours after its injection, but that after seventy-two hours none was present, as then the kidney extract failed to sensitize guinea-pigs to egg-white. Pearce then conducted a series of observations to determine whether the kidney contained more egg-white than other organs or whether the amount present was really determined by the quantity of circulating blood in the organ. This was done by comparing the sensitizing efficiency of the blood, liver, and kidney of animals that had received an injection of egg-white intravenously, and also by comparing the sensitizing power of blood and of the extracts of washed and unwashed kidneys.

The results obtained were conclusive, and showed that the sensitizing power of an organ, *e. g.*, the kidney, depended upon the amount of egg-albumen present in the blood, and that there was no evidence of any peculiar fixation by the kidney. Some similar experiments carried out on animals in which nephritis had been produced experimentally, either with uranium nitrate or potassium chromate, showed that when nephritis was present there was some delay in the excretion of the egg-white, amounting to an additional twenty-four or forty-eight hours. Further experiments showed that in normal animals the urine contained egg-white in sufficient quantities to sensitize animals, and that this excretion of egg-white is practically completed in forty-eight hours after its intravenous injection. On boiling the urine during the first twenty-four hours, a heavy solid albuminous clot is formed, quite different in physical characters to the clot produced by boiling urine containing serum albumen. After forty-eight hours, little or no precipitate is obtained. The fact that the coagulable protein disappears after forty-eight hours is also strong evidence that it is really egg-white that is present, but this is proved conclusively by the ingenious use of the anaphylactic test made by Pearce, and thus the controversy as to the nature of the albuminuria seen after the injection of egg-white must be

regarded as settled and that the albumin excreted is that introduced intravenously. It would seem, from these experiments, that there is no evidence of foreign proteins at any rate being fixed by the kidney cells, and thus, if such bodies produce nephritis, it would be rather in the course of their elimination than owing to any special selective fixation.

Foix and Salin<sup>1</sup> give the record of their work on the study of *Paroxysmal Hemoglobinuria* by a continuation of their observations on experimental hemoglobinuria. In PROGRESSIVE MEDICINE for 1912, the results of their work to that date was given, and this tended to show that all cases of hemoglobinuria were not to be explained on the basis of the work of Donath and Landsteiner, *i. e.*, that a hemolysin existed in the plasma, both during the attack and also in the intervals.

Foix and Salin consider that, in some cases, the plasma is free from such hemolysin, and that the red corpuscles are primarily at fault, and that the hemolysis is dependent upon a preternatural fragility of the red corpuscles. They consider, in the communication now under review, that they have shown clinically that in some cases of paroxysmal hemoglobinuria the serum of the patient has no hemolytic action, either during the attack or in the intervals, on the corpuscles of the healthy nor even on the corpuscles of the affected individual, and thus the phenomenon described by Donath and Landsteiner may be absent. In these cases, the red corpuscles of the patient, if separated by the centrifuge, are hemolyzed by any human serum. This peculiar fragility of the red cells is only seen very exceptionally in conditions other than paroxysmal hemoglobinuria.

Both before and after an attack of hemoglobinuria the urine of these patients contains more or less albumin, and the authors consider that the presence of numerous casts in the urine confirms the idea, long entertained, that in these cases there is some disturbance of the renal functions. The casts, however, are, as is well known, of a quite peculiar type, inasmuch as they consist of granular matter, showing by micro-chemical tests the presence of iron. Further, these patients usually show some enlargement of the spleen with slight jaundice that is usually regarded as of hemolytic origin. This splenic enlargement they regard as of secondary origin, and they agree with other recent writers in considering syphilis an antecedent factor of great importance in nearly all the cases.

From the experimental standpoint, they summarize their results as follows: The intravascular injection of a hemolytic serum will produce a hemoglobinuria analogous, in its duration and its intensity, to that seen in paroxysmal hemoglobinuria. With small doses of such a serum, partial destruction of the red corpuscles is produced, and the red cells that are not hemolyzed show evidence of slight fragility so that they are readily hemolyzed by hypotonic sera. If the dose of hemolytic

<sup>1</sup> Archiv. de Medécine Experimentale, Tome xxv, No. 1.

serum injected is larger, then the fragility of the red corpuscles is more marked, and they undergo hemolysis with normal sera. The authors consider that the toxicity of hemolytic sera is such that it is impossible to introduce such sera in quantity sufficient for the blood of the animal injected to contain such free hemolysin, and they think this is the reason their experimental animals have never shown the phenomenon of Donath and Landsteiner, *i. e.*, the presence of free hemolysin. From this they conclude that a hemolysin present in the blood stream is fixed immediately by the red corpuscles. If an autolysin is present in the serum, this must be due to one of two causes, either there must be a great excess of the hemolysin present or else it must be set free in the serum at the moment of coagulation. There is a great contrast between the plasma, only slightly tinted with hemoglobin, and the urine, which is so darkly colored; therefore they think that the kidney can scarcely act as a simple filter in cases of hemoglobinuria. Further, they have been able to produce, in the living animal, hemoglobinuria by exposure to cold. The presence of free hemoglobin in the blood is capable of causing temporary renal lesions lasting from twenty-four to forty-eight hours, characterized by albuminuria and, in some cases, even hematuria.

With regard to the splenic enlargement seen clinically, the authors think that this is secondary, and that it is a hyperplasia thanks to which the broken down-remnants of the red corpuscles are ingested by macrophages. Some authors have regarded the splenic hypertrophy as primary and as the actual cause of the hemolysis, the spleen elaborating, under abnormal conditions, some hemolytic agent. Foix and Salin find that the splenic extract possesses but little hemolytic power, and that this is not due to a true hemolysin, since the splenic extract is thermostable and, further, it is not specific to the spleen. They think that the action of the splenic extract is probably dependent upon some lipoid substance.

They conclude their work with the suggestion that the following hypothesis accounts best for the facts seen in paroxysmal hemoglobinuria: As a sequel to some infection, and generally the infection is syphilis, a hemolytic substance is present in the circulation, this hemolysin is sometimes fixed by the red corpuscles and sometimes is free in the plasma. In the former instance, the cases are of the type described by these authors; in the latter, they are of the type described by Donath and Landsteiner, Eason, and others. The red cells so altered are then hemolyzed by the action of cold, the hemoglobin so set free in the plasma causes, by its toxic action, some renal lesions, and it is possible, so these authors think, that the kidney may, in some obscure way, aid the hemolysis. A certain quantity of hemoglobin remained in the blood and very probably also some red corpuscles more or less profoundly altered; these are destroyed by the spleen, and this process is often accompanied by some temporary slight icterus.

The concluding portion of Foix and Salin's work would thus, in some way, seem to be an approximation to the views of Donath and Landsteiner, since the latter agree that before hemolysis occurs the hemolysin is fixed by the red cells. The main difference between the two theories would lie in the fact that, according to the one, the plasma is always hemolytic, and hemolytic not only to the corpuscles of the patient but also to those of the normal individual; whereas, according to the other, the plasma not only contains no hemolysin but the corpuscles are so damaged by the fixed hemolysin, that they will undergo hemolysis under the influence of a normal serum.

Foix and Salin's explanation is ingenious, and it will be interesting to see whether future work will confirm their facts as to the fragility of the red corpuscles and the absence of a hemolysin in the blood stream.

**Nephritic Hypertension.** T. C. Janeway<sup>1</sup> reviews our present conceptions with regard to high tension in renal disease under the title of "Nephritic Hypertension, Clinical and Experimental Studies." This subject has attracted attention from the outset, since Bright in his classical paper, in 1836, observed quite correctly the clinical association of enlarged heart, without valvular disease, with the presence of renal disease. Bright himself hazarded the view that the cardiac hypertrophy was either due to some substance in the blood directly stimulating the heart, or else to some increase in the peripheral resistance, *i. e.*, that the hypertrophy was due to unusual work, and that the cause of this unusual work must be either central or peripheral. The introduction of the sphygmomanometer has made the study of this condition more exact, and has added much to our knowledge of high tension.

In nephritis there is not only the hypertrophy of the heart but there is also high tension, and Janeway agrees with the bulk of other workers that in the main the cardiac hypertrophy may be regarded as the result of the high tension, although cases are occasionally seen in which the heart is enlarged and the blood pressure is not above the normal. Further, high tension may exist when the heart is markedly incompetent, and thus Janeway is of opinion that cardiac hypertrophy cannot cause high tension, although it may be a contributing factor.

In discussing the different views that have been advanced to explain the *high tension of renal disease*, Janeway deals first of all with the so-called *mechanical theory* that attributed the high tension merely to an increased resistance to the passage of blood through the kidney. This view cannot be supported either on experimental grounds or on the results of morbid anatomy, since the degree of high tension and of cardiac hypertrophy cannot be correlated with the degree of glomerular change present in the kidneys, and there is no strict parallelism between glomerular changes and blood-pressure. There is much more to be said in favor of the view that the high tension is due to some *altered*

<sup>1</sup> American Journal of the Medical Sciences, vol. cxlv, No. 5.

*composition of the blood*, and the bulk of the modern work on the subject has centred around this theory. Several observers have found that if the amount of kidney substance be greatly reduced by the excision of a portion of one kidney and the whole of the other, the blood-pressure is raised, provided that the quantity of kidney removed is not so extensive as to cause cachexia and death.

Janeway has confirmed the earlier work on this subject with a fresh series of observations, and in some of these the increase in the blood-pressure was quite considerable, the pressure rising from 110 mm. to 145 mm. in one case, and, in another, from 135 to 165 mm. of mercury. This hypertension persisted for considerable periods, *e. g.*, 104 and 163 days, and was accompanied by an increased excretion of urine as in the earlier experiments of this type carried out by other observers. It is not clear what the mechanism of this increased blood pressure is, but it must be associated with an increased tonus of the systemic arteries.

Many attempts have been made to detect a pressor substance in the blood, and at one time a body called *renin* was thought to be present in the kidney and the liberation of this in the blood stream as a result of the disintegration of the kidney was considered to be the causative factor of high tension. The most careful recent work has failed to confirm these results, and, as Janeway points out, it is precisely in the cases in which the breaking down of the kidney is minimal that the high tension is maximal, and for this reason he dismisses this theory as quite inadequate.

The next attempt to explain the high tension was based on the theory that it was due to the *increased secretion of the adrenals*, and hyperplasia of these glands has been described in renal diseases, and arterial lesions resembling those present in arteriosclerosis have been described as producible by the injection of adrenalin experimentally. Other observers claim that they have detected adrenalin in the blood of cases of high tension, but it has been shown that the vasoconstrictor substance found in defibrinated blood and serum is not adrenalin but is more probably some substance found during coagulation and not present in the circulating blood. It would thus seem impossible to regard the high tension of renal disease as due to an increased activity of the adrenal glands in the light of our present knowledge.

Janeway deals next with the clinical side of the problem, and he has analyzed the records of 459 cases observed by himself in which the systolic blood-pressure was over 165 mm. of mercury. He considers that these cases may be divided into groups, the largest group being formed by individuals past middle life in which the clinical picture is one of cardiac insufficiency, and in which death results from the cardiac lesion. Arteriosclerosis is often associated with such cases, and anginoid attacks are not uncommon; in some cases glycosuria is also present. The urine may at some period show the presence of albumin and casts,

but not uncommonly such cases show, during life, few renal phenomena other than those due to passive congestion. Sometimes these cases show a high blood-pressure, and the kidneys are found to be normal or only congested secondarily as a result of the failing heart. In a second group, headache, vertigo, and apoplectic attacks occur; in these cases polyuria is more frequently present and, in many, there is evidence of serious impairment of the functional activity of the kidneys, and many of these patients die of uremia. Janeway is distinctly of the opinion that one form of renal disease, *i. e.* the red granular kidney, is the result of a primary arterial lesion, and that the origin of this malady is not necessarily renal. It is possible that the high blood pressure precedes the anatomical changes, and that the increased tension is primarily due to overindulgence in food, tobacco, coffee, etc., and possibly to the sedentary life so common in these days. Janeway considers that retention of toxic substances may explain some cases of high tension; thus, he has seen a tension of 180 mm. of mercury as a result of the excision of the only functional kidney, and many observers have described high tension in cases of anuria. He has also seen high tension in cases in which there was but little kidney substance. Thus, in one case, a pressure of 200 mm. of mercury was associated with complete infarction of one kidney and passive congestion of the other. He also draws attention to the interesting cases in which, with cardiac failure and passive congestion of the kidneys, there is high tension; he is inclined to the view that the high tension is then due to the renal disturbance produced by the passive congestion.

Janeway sums up his conditions as follows: (1) High tension may arise as a result of the mere reduction in quantity of the kidney substance below the margin of safety, and he thinks it probable that, in these cases, the cause of the high tension is an increased activity of the vasomotor mechanism brought about as a result of the presence of poisons of some kind. (2) High tension may arise in connection with the intoxication known as uremia, and this condition is not one of pure retention of poisons, though it is more commonly present in those diseases in which there is distinct evidence of retention, *e. g.*, cases of advanced nephritis. (3) High tension may arise as a primary disturbance of the vasomotor apparatus and then its origin is due to extrarenal causes, although the consecutive arterial disease induced may ultimately lead to the production of renal disease in the form of the red granular kidney.

# GENITO-URINARY DISEASES.

BY CHARLES W. BONNEY, M.D.

## THE KIDNEY AND URETERS.

**Renal Tuberculosis.** In the vast majority of cases, tuberculosis of the urinary organs begins in the kidney, and the chances of obtaining a complete cure in these cases are much better if surgical treatment can be practised before the bladder and other organs have become involved. Just as in malignant disease of the stomach, uterus, and mammary gland, so in renal tuberculosis better results are to be expected in the future not by any great advances in methods of diagnosis and operative technique, but rather by a dissemination of knowledge concerning the initial manifestations of the disease, the importance of early diagnosis, the comparative facility with which it can be made, and the necessity of prompt resort to surgical treatment as soon as the nature of the trouble has been ascertained. If patients come under observation early in the course of their disease, the chances that they can be cured by a unilateral nephrectomy are very good. In a recent communication on the subject, Rovsing<sup>1</sup> stated that of two hundred patients who came under his care, forty were in a hopeless condition, and one hundred and thirty were affected with lesions of the bladder at the time he first saw them. In about 60 per cent. of the cases, pain in the back, loss of flesh, fatigue, and cloudiness of the urine had been present for a considerable time before any vesical disturbances manifested themselves. In such cases it is not uncommon for the physicians who are consulted by the patients to make an erroneous diagnosis of nephritis, with the result that the patients are treated week in and week out without obtaining any benefit whatever. Some of Rovsing's cases had not only been thus erroneously diagnosed, but a milk or milk and vegetable diet had also been prescribed, which caused the patients to become even weaker than they were at the beginning of their treatment. Such symptoms as hematuria and pyuria should always arouse suspicion of tuberculosis in the absence of associated signs or symptoms which point directly to other causes. A much earlier sign, and one which I believe to be of the greatest importance, is an undue *frequency of micturition*. This is particularly true in women. Following the teaching of Casper, it has become my invariable practice to investigate most carefully for tuberculosis in such

<sup>1</sup> Annals of Surgery, October, 1912.

cases unless there be some pelvic condition which accounts for the symptoms. In examining the urine for *tubercle bacilli*, Rovsing recommends the method of Forsell, which consists in allowing the total quantity voided in twenty-four hours to stand until a precipitate is deposited, and then centrifuging the latter. He likewise calls attention to the fact that in cases in which one kidney has become badly diseased, urine containing albumin may be drawn from the other kidney, even though the latter be not tuberculous. Here we have to do with a toxic albuminuria caused by absorption of poisonous products from the diseased kidney, which are excreted through the healthy one. With reference to *cystoscopy* and *urethral catheterization*, Rovsing advises that only the former be practised. He believes that there is some danger of infecting the other kidney if the catheter be used. The limitations of cystoscopy are referred to. Thus, he states that a limpid urine may not be a perfectly normal one, and that the ureteral orifices may appear healthy when the kidney contains a tuberculous focus. Further experience with the 6 per cent. carbolic acid injections, which were mentioned in this review in 1911, has proved them to be very satisfactory. In bilateral tuberculosis, a ureterostomy is performed, and the urine drained from the wound. In very advanced cases, suprapubic cystotomy has afforded some relief.

At the last meeting of the French Urological Association<sup>1</sup> a symposium on renal tuberculosis was held, during which every method of treatment was thoroughly discussed. The consensus of opinion was that the disease is essentially a surgical one and that all methods of treatment other than operation should be reserved for those cases in which operation is contra-indicated.

Castaigne, Gouraud, and Lavenant<sup>2</sup> recommend the *immunizing bodies of Spengler* in the treatment of inoperable cases, beginning with small doses and progressively increasing. They report four cases of patients affected with ulcerating tuberculosis in which improvement took place. In six cases of the non-suppurating form of the disease, albuminuria and vesical pain disappeared after the treatment, and in six others, in which there was an intermittent albuminuria and in which the urine produced tuberculosis in guinea-pigs, the albumin also disappeared.

THE TREATMENT OF THE URETER AFTER NEPHRECTOMY FOR TUBERCULOSIS has been the subject of much consideration on the part of different operators, inasmuch as tuberculous lesions of the bladder were found to heal spontaneously after the diseased kidney had been removed. It was at one time thought that lesions in the ureter would likewise undergo spontaneous cure. This expectation, however, was not always realized, so various methods of dealing with the ureter came to be

<sup>1</sup> Process Verbaux de l'Ass. Fran. d'Urologie, 1912.

<sup>2</sup> Journal Medical Français, November 15, 1912

adopted. The treatment with carbolic acid is well known. Some surgeons, for instance Schlagintweit, has endeavored to destroy the tube by means of electricity. Others have sought to make complete extirpation of the ureter by prolonging the nephrectomy incision around the body parallel to Poupart's ligament, and then dissecting the tube out in its entirety. Thus, Longard makes an independent incision parallel to Poupart's ligament, through which the ureter is dissected out and removed. About two years ago Lilienthal published a paper in which he laid great stress upon the entire removal of the ureter in cases in which it was badly diseased or so constricted in its lower part as to make good drainage impossible. In a more recent publication,<sup>1</sup> he states that he has now done such an extirpation about twenty times. His method is somewhat similar to that of Longard, although he inserts a catheter into the ureter through its distal end before dissecting it out. He describes his operation as follows: "Having performed a nephrectomy, an ordinary urethral bougie, 10 or 12 French, is pushed down through the ureter from its upper divided extremity to the bladder and tied in place with a ligature. The ureter is now digitally isolated through the nephrectomy wound as far down as possible. The nephrectomy wound may then be closed by suture in the usual manner and drained by tube, gauze, or rubber dam. The patient is next placed upon his back and a short inguinal incision, parallel to Poupart's ligament, seldom more than two inches in length, is made, its lower inner extremity being close to the external border of the rectus is carried down through the tissues as far as the peritoneum. Now the finger is used to push the unopened peritoneum away from the pelvic wall. The ureter, with its contained bougie, is extremely easy to recognize and, in fact, can hardly be missed. With the back of the finger toward the pelvic wall, the ureter is peeled away from the peritoneum. The danger to the great iliac vessels is practically zero, since the ureter always adheres to the peritoneum and is lifted away with that structure.

"With a little manipulation the ureter is drawn out of the wound, loosened from below upward and, as a rule, is very easily drawn, with its contained bougie, out at the inguinal wound. The bougie is now extracted, and it will be found that the entire ureter down to its termination at the bladder can be drawn up into the wound. Here it is ligated, cut off, and the stump carbolized. The wound is closed with three layers of sutures, with or without drainage." It is stated that this method of removing the ureter does not prolong the ordinary duration of the operation for more than ten or fifteen minutes.

Two years ago William J. Mayo<sup>2</sup> filled the wound, following a nephrectomy for tuberculosis, with salt solution and then closed it up. Union took place by first intention, and since that time he has used this method

<sup>1</sup> American Journal of Surgery.

<sup>2</sup> Surgery, Gynecology, and Obstetrics, November, 1912.

as a matter of routine. In cases in which no tuberculous material escapes into the wound, he does not use the serum. It is interesting to note that Mayo has never had reinfection or other accident following the injection of carbolic acid in the ureter after operation in tuberculosis, as many surgeons have had.

F. Suter<sup>1</sup> has published statistics of the cases of patients upon whom he has operated during the last six years and a half. There was one death immediately after the operation, autopsy showing a tuberculous peritonitis. Four patients succumbed in from two to three years after the operation, one death being due to pulmonary tuberculosis, one to puerperal infection, one to miliary tuberculosis, and one to uremia. Of fifty-five patients living at the time the paper was written, there were five upon whom operation had been done within six months. Of the fifty others the author considered twenty-eight, or 56 per cent., cured, and seventeen, or 34 per cent., much improved. Five of the seventeen patients were passing clear urine, although they still had some vesical irritation. One patient has a fistula. Five patients, or 10 per cent., were only temporarily benefited. The author's experience coincides with that of many surgeons who consider the ultimate prognosis much less favorable in cases in which bladder disturbances are present to any extent at the time of operation, when operation is performed late, and also when there is an associated genital tuberculosis, as is frequently the case in men. The author also considers the prognosis better in women than in men.

RENAL TUBERCULOSIS IN CHILDREN was made the subject of exhaustive study about a year and a half ago by Vingard and Thevenot, who succeeded in collecting forty-seven cases, in seventeen of which nephrectomy was performed. The comparative infrequency of this affection in childhood has led other surgeons to report cases which have come under their observation. Chief among these may be mentioned the paper of Rocher and Ferron,<sup>2</sup> of Bordeaux, who have reported seven cases. As cystoscopy and ureteral catheterization in children is often beset with difficulties, their cases are of great interest because these methods were routinely employed. They used the direct cystoscope of Luys, the employment of which they consider always possible, and in little girls past the fifth year even easy. A slight Trendelenburg position suffices to secure distention of the bladder. The ureteral orifice generally is found to admit a No. 6 or No. 7 catheter, although in one of their cases nothing but an extremely small bougie could be made to enter. The condition, however, was believed to be congenital, and not at all dependent upon the age of the patient. In a number of cases, general anesthesia was required, not so much because the manipulations were painful as because the children, being frightened by the prepara-

<sup>1</sup> Münch. med. Wochschr., November 5, 1912.

<sup>2</sup> Journal d'Urologie, February 15, 1913.

tions and the sight of the instruments, could not be made to lie still unless they were anesthetized.

**Renal and Ureteral Lithiasis.** For a long time after its introduction, the operation of PYELOTOMY FOR THE REMOVAL OF CALCULI was looked upon with disfavor by the majority of surgeons. During the last few years, however, it has constantly gained ground, so that at the present time it is probably considered preferable to nephrotomy in a large percentage of cases by the most experienced surgeons. That this change in attitude is dependent largely upon better technique and greater familiarity with the procedure is not to be doubted. Moreover, certain theoretical objections which were brought against it have not held good in actual practice. During the year several contributions to the subject have been made.

Baum<sup>1</sup> considers pyelotomy to be the ideal method of treatment in renal lithiasis, maintaining that nephrotomy should be reserved for those rare cases in which the parenchyma of the kidney itself contains multiple calculi, or in which abscesses are present or there is some other lesion which makes it necessary to open the kidney. He recognizes the possibility of failure in detecting all the stones in cases of multiple calculi, although he believes that the danger of such an occurrence has been very greatly lessened as advances have been made in *x*-ray diagnosis. He furthermore calls attention to several cases in which calculi had been left in place during a nephrotomy. As far as urinary fistulæ are concerned, he shows that they have become less and less common as operative technique has been improved. That nephrotomy is not so simple an operation as some seem to consider it, is shown by the occasional bad results which follow it in the hands of the best renal surgeons. Baum mentioned several cases in which hemorrhage, both primary and secondary, has been followed by disastrous results, as well as some in which necrosis of the kidney had taken place. These dangers will be referred to again in the discussion of anomalous blood vessels.

In order to prevent the formation of fistula which sometimes takes place after pyelotomy, Payr<sup>2</sup> has practised a method which has given him excellent results. The incision in the pelvis of the kidney is sutured with two layers of catgut and silk, and the suture is then passed through a flap taken from the capsule. This flap is taken from the posterior surface of the kidney, its base being on a level with the hilum. It is drawn over the wound in the hilum by means of a suture previously passed through it and then held in place by a few separate stitches. It has been found that this autoplasic operation completely closes the pyelotomy wound.

Eisendrath,<sup>3</sup> of Chicago, writing on the same subject, states that if

<sup>1</sup> Med. Klinik, December 8, 1912.      <sup>2</sup> Centralbl. für Chirurgie, 1912, No. 44.

<sup>3</sup> Medical Record, February 15, 1913.

the pedicle is short or there be adhesions to any extent, pylotomy is not to be thought of, because even slight traction might result in disaster. He has found the extraction of movable calculi from a diverticulum, or from one of the divisions of a bifid pelvis, to be very simple. In summarizing the advantages of the operation, he states that hemorrhage is less likely to occur even during the operation or afterward than it is in a nephrotomy; that the operation can be performed in a shorter time; that the period of convalescence is shorter; that it is the best procedure for removing calculi from horse-shoe kidneys; and, finally, that it is the easiest and least dangerous way of removing calculi lodged at the junction of the pelvis and the ureter. Furthermore, he states that bimanual palpation of the pelvis, and of the kidney itself, diminishes the risk of allowing the calculi to go undetected. Granting the truth of this statement it is nevertheless difficult to understand why such a procedure is considered superior to laying the kidney wide open and examining its interior for calculi as is done in nephrotomy. His other contentions in favor of the operation seem very well taken.

Oelsner,<sup>1</sup> of Casper's clinic, has reported 17 cases of pyelotomy, and is of opinion that the operation has a wider range of usefulness than has been attributed to it. He maintains that it is applicable in cases of branched or coral-shaped stones. Of the 17 cases, there were 15 in which more or less infection had already taken place. In 14 cases the pelvis of the kidney was sewed up; in 3, drainage was employed. A T-shaped tube of the kind used for draining the common bile duct is recommended. Irrigation through the tube is begun the day of the operation and continued for a week. The longest duration of any renal fistula was four weeks. If pyelitis persists after the wound is closed, irrigation of the pelvis of the kidney is made through the ureteral catheter. In all but three cases thus treated benefit was apparent from the first, but in those three no effect whatever was produced. Vaccine therapy was also without effect.

Another surgeon who writes favorably of pyelotomy is J. Bentley Squire,<sup>2</sup> of New York, who prefers it to nephrotomy in cases in which the stone can be located with the fingers and carried down into the pelvis of the kidney. He sutures the incision through which the calculus is removed unless there be a coexistent pyelitis, in which case he drains the wound.

A similar opinion is expressed by John H. Gibbon,<sup>3</sup> of Philadelphia, in a paper treating of ureteral as well as renal stone.

John B. Deaver,<sup>4</sup> of Philadelphia, has reported sixty cases of calculus of the kidney or ureter. In a few cases, typhoid fever preceded the

<sup>1</sup> Zeitsch. für Urologie, July, 1913.

<sup>2</sup> Medical Record, February 8, 1913.

<sup>3</sup> Annals of Surgery, August, 1913.

<sup>4</sup> Medical Record, February 15, 1913.

appearance of the symptoms of stone. The catarrhal condition of the mucosa of the renal pelvis and of the ureter is considered the most important predisposing cause for the formation of calculus. Traumatism is mentioned as an exciting cause. Repeated attacks of renal colic were found to be due more commonly to stone in the ureter than to stone in the kidney. The localization of pain, its type, and the frequency with which the attacks occur give evidence of the location of stone. Physical examinations, in cases in which no infection has taken place and in which no complications are present, have not afforded the author any diagnostic information in more than one-half of the cases. In some cases, however, in which the stone is in the kidney, that organ had become so diseased as to be palpable. The *x*-rays failed to reveal stones in five cases in which they were subsequently found at operation. In three of these cases, they were found in the ureter; in two, in the kidney. The author does not consider the wax-tipped ureteral catheter of much diagnostic worth, stating that he has greater confidence in the clinical history of the case. When calculi are located in the inferior part of the ureter within a distance of twenty-five millimeters from the bladder, he recommends their removal by the transvesical method. In cases in which a kidney stone is suspected but cannot be located by palpation after the kidney has been brought out of the incision, he recommends the use of the exploring needle, a procedure which he has come to look upon as being devoid of danger.

A very large renal calculus weighing 340 grams was removed from a woman forty-nine years of age by Berezovsky,<sup>1</sup> the case being reported by A. A. Grave, of Moscow. The calculus was lodged in the pelvis of the kidney, and at its inferior portion there was attached a second one which weighed  $31\frac{1}{2}$  grams. The renal parenchyma was largely destroyed.

Bransford Lewis,<sup>2</sup> in discussing the treatment of ureteral calculi, makes a plea for the more frequent employment of the cystoscopic method. The most important part of his article is that which treats of the seriousness of the surgical method. He cites the statistics of Tenney, based upon one hundred and thirty-four cases, from which all deaths due to anuria were excluded, and which showed a mortality of 12 per cent. The not uncommon necessity for more than one operation, late postoperative hemorrhages, and the development of uremia are also mentioned as serious complications of the surgical method. In view of these facts, he recommends that an attempt should always be made to dislodge the stone through the cystoscope. The lower down the calculus is situated, of course the greater are the chances for success in removing it. If it be just above the ureteral opening, it may sometimes be grasped with the forceps and very easily removed. Dilatation

<sup>1</sup> Chirurguia, November, 1912.

<sup>2</sup> New York Medical Record, November 16, 1912.

of the orifice will make it easy to remove some stones which cannot otherwise be taken away. For the dislodgement of calculi situated farther up in the ureter, that is from an inch to an inch and a half above the opening, flexible forceps have been found very useful. The injection of oil or glycerin is resorted to in some cases to facilitate the descent of the stone. The manipulations can be made under local anesthesia. The author believes it well worth while to make repeated attempts at bringing away calculi in such cases.

F. S. Watson,<sup>1</sup> of Boston, states that the administration of 10 minims of oil of turpentine three times a day has proved to be the most satisfactory non-operative treatment of renal and ureteral calculi. He believes that the turpentine dissolves secretions around the stones which tend to hold them in place, and also that they are passed with less pain when the drug is given than is otherwise the case. He has used the treatment in 66 cases. In 51, the stone was passed; in 7, it was not passed; and in 8, the patients failed to report. The turpentine is given for six days, then discontinued for two days, and then given for six days again, the patient being kept on a diluted milk diet with a little fish and toast added.

Robert Ollerenskau<sup>2</sup> has reported two cases of renal calculus in children, one in a little girl, aged three years, and the other in a child aged eight. He believes stone to be more common in childhood than it has generally been thought to be, and consequently advises that a radiographic and, if possible, a cystoscopic examination be made in all cases of obscure pain in the abdomen or loins.

Precancerous conditions are being made the subject of much study by the progressive members of the profession, and the removal of sources of tissue irritation, or chronically inflamed areas of tissue themselves, have rightly come to be looked upon as measures tending to prevent cancer. The relation of chronic ulcer of the stomach to carcinoma is now well recognized, and the work of Wilson and MacCarty, of Mayo's clinic, shows that cancer of the gall-bladder is frequently superimposed upon chronic inflammatory lesions. In this connection a study of neoplasms of the renal pelvis, by Franz Stusser,<sup>3</sup> is of interest. In eleven cases of carcinoma there was a history of renal stone in seven, or more than one-half. Stüsser's analysis of cases is very comprehensive, and corroborates the opinion of the late J. Albarran, who maintained that there was a causal relation between calculi and neoplasms. He thought that the irritation produced by the stones led to a condition similar to leukoplasia, upon which carcinoma was prone to develop.

**The Relation of Anomalous Vessels and Ureters to Renal Pathology and Surgery.** In a recent work<sup>4</sup> I called attention to an anomalous relation

<sup>1</sup> Boston Medical and Surgical Journal, January 9, 1913.

<sup>2</sup> British Medical Journal, January 18, 1913.

<sup>3</sup> Beiträge zur klin. Chir., 1912, Heft 3.

<sup>4</sup> American Journal of Urology, December, 1912.

of the renal bloodvessels which, so far as I know, has not been mentioned in any text-book on anatomy. Out of 40 cadavers having a single renal artery on both sides, in 5 the artery crossed the vein and became anterior to it at various distances from its origin to its entrance into the hilum, and the same relation obtained also in 6 out of 19 cases in which multiple renal arteries were present.

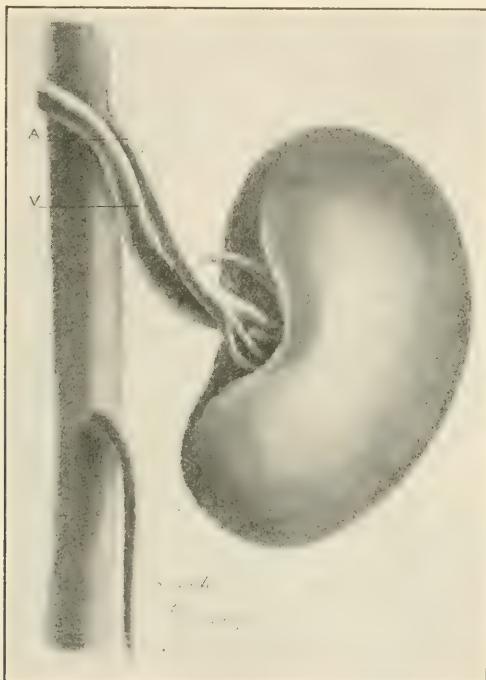


FIG. 21.—Showing the artery crossing the vein. *A*, artery; *V*, vein.

This relation of the artery to the vein I believe to have a possible pathological significance, inasmuch as it seems not improbable that pressure of the firmer vessel on the more elastic one might result in stasis within the kidney, and eventually lead to morbid structural changes which might affect the functional power of the renal epithelium. Such an occurrence would be more probable in cases in which the kidneys are abnormally movable either as the result of laxity of the renal fascia or the existence of a pedicle of unusual length, as sometimes has been observed when a supernumerary artery has entered the substance of the kidney itself above or below the hilum. Hardening of the artery might also have the same effect, and thus hasten an already beginning morbid renal process primarily dependent upon the same causes which have produced sclerosis of the vessels. It has occurred to me also that

there may be some relation between transient or so-called functional albuminuria and temporary stasis thus produced, and my friend, Dr. William H. MacKinney, has suggested that some cases of essential hematuria may also be due to the same condition. The etiological effect of congestion is now generally admitted and it seems not improbable that sufficient pressure might result from such an arrangement of the vessels as to give rise to bleeding.

Two papers published during the year by Alexander Randall<sup>1</sup> and David Newman<sup>2</sup> respectively treat of the effect of congestion in the production of essential hematuria. Dr. Charles M. Harpster,<sup>3</sup> of Toledo, reports a case of profuse hemorrhage, necessitating nephrectomy, in a patient who was found to have three anomalous renal arteries. It is possible that a slight traumatism may have been the exciting cause in this case. Harpster quotes extensively from my paper.

Attention was also called to the fact that superior polar arteries, derived either from the aorta itself or from the renal artery, are likely to be ruptured when the kidney is delivered through a lumbar incision. This is especially true of the short supernumerary arteries passing transversely from the aorta to the upper pole of the kidney. If the kidney has been so bound down by diffuse perirenal inflammation that it cannot be brought outside of the wound until it has been divided, the danger of hemorrhage is also great, although under such circumstances polar arteries are not so much to be feared as are accessory trunks from the aorta or branches from the main renal artery which enter the substance of the kidney above or below the respective margins of the hilum.

Furthermore, attention was called to the fact that there is not any anastomosis within the kidney between the various subdivisions of the renal artery which enter the hilum at different points, as a result of which it naturally follows that division of a single artery entering the organ will cut off the blood-supply from a portion of the latter. While the possibility of sphacelation of the part deprived of blood was considered, the view was expressed that the formation of an anemic infarct would be the more probable occurrence. The question arose, however, as to whether the hyperpyrexia, high leukocytosis, vomiting, and other manifestations of severe constitutional disturbance, which precede the sudden exitus of patients who succumb after kidney operations of various kinds, might not be due to a gangrenous area in the kidney following the ligation or rupture of a bloodvessel. Particularly interesting in this respect is a case recently reported by Legueu,<sup>4</sup> of Paris. It was that of a young man in whom a pyelotomy was performed. On the fourth day after the operation a hematuria suddenly developed

<sup>1</sup> Journal of the American Medical Association, January 4, 1913.

<sup>2</sup> British Journal of Surgery, 1913, No. 1.

<sup>3</sup> Urologic and Cutaneous Review, July, 1913.

<sup>4</sup> Mouvement Médical, January, 1913.

which lasted six days, and which began again after a cessation of forty-eight hours. It was decided to open the wound, and, as the upper part of the kidney appeared necrotic, nephrectomy was done. Further examination showed that the upper fourth was gangrenous and the little artery which had been ruptured at the previous operation was very plainly seen near the border of the gland. I recently saw a case similar to this in the Jefferson Hospital, in the service of Dr. Charles F. Nassau. Reference has already been made to cases of this kind collected by Baum.

It has been suggested that partial resection of the kidney, instead of ligation of a supernumerary artery, might be resorted to, but uncertainty of knowing what portion of the organ is actually supplied by a vessel entering a given site would preclude the practical application of such a theory.

In the presence of hydronephrosis caused by an abnormal artery, Legueu suggests that neoimplantation of the ureter, if skilfully performed, might be the best operation. He condemns division of the artery, and also believes that it would not be advisable to cut the ureter and replant it in front of the artery, fearing lest such a procedure might result in constriction of its lumen and thus increase the urinary retention. For such a delicate operation he suggests that it might be better to operate through an abdominal incision instead of through a lumbar one.

Arthur Cabot,<sup>1</sup> of Boston, has reported two cases of injury to the vena cava during operations for the removal of pyelonephrotic kidneys. Because of the danger of such accidents, he advises that the operation be done in two stages, first a nephrotomy and then a nephrectomy.

**Hydronephrosis.** In its early stages, hydronephrosis may be extremely difficult to diagnose. Whether it be due to mobility of the kidney or to an anomalous vessel situated near the lower pole, it may give rise to attacks of pain simulating those of renal colic. In such cases, little is to be gained either by the ordinary physical examination of the patient or by the examination of the urine, the condition of the latter varying greatly in different cases and also at different times in the same case. Catheterization of the ureters enables one to determine the capacity of the renal pelvis and has proved of help in many cases which would otherwise have remained obscure. Pyelography, which has been introduced in comparatively recent times, has received study by a number of different urologists and surgeons. It was mentioned in last year's review. During the present year two noteworthy contributions to the subject have been made, one by Hugh Cabot,<sup>2</sup> of Boston, and the other by F. Voelcker,<sup>3</sup> of Heidelberg. Both consider the method of great value.

<sup>1</sup> Boston Medical and Surgical Journal, October 24, 1912.

<sup>2</sup> Journal American Medical Association, January 4, 1913.

<sup>3</sup> Zeitsch. für Urol. Chir., March 7, 1913.

Voelcker and von Lichtenberg were the originators of the method, and Voelcker states that his further experience has only served to increase his belief in its efficacy as an accurate diagnostic method.

In discussing the indications for operation in these cases, Cabot expresses the opinion that neither mobility of the kidney nor slight distention of the renal pelvis should lead one to operate, for one or both of these conditions may be present without causing any trouble. The attacks of pain which lead the patient to seek advice constitute the indication for surgical intervention. With reference to the normal capacity of the renal pelvis, Voelcker takes exception to the views held by Braasch. He considers the normal capacity to be between two and four cubic centimeters, and that any pelvis which can be injected with more than five cubic centimeters to be in the early stages of dilatation. My own studies in the anatomy of the kidney lead me to accept Voelcker's ideas on this subject. Certainly, I cannot understand how a renal pelvis having a capacity of fifteen to twenty cubic centimeters can be considered normal.

**Renal and Perirenal Complications of Furunculosis.** In last year's review, a number of cases of metastatic renal and perirenal abscesses following furunculosis were discussed. In a recent communication, R. D. Santos,<sup>1</sup> of Lisbon, has published a paper on the subject in which he recommends the use of vaccines before resorting to operation. If amelioration does not take place by the tenth or twelfth day under this treatment, he splits the capsule of the kidney and hunts for the areas of suppuration. He states that an intrarenal abscess usually precedes suppuration around the kidney. While vaccine treatment might be resorted to in cases seen early and in which the symptoms are mild, I have so little confidence in its value that I certainly could not acquiesce in the opinion that it should be tried in cases of any severity. It is good surgery to liberate pus wherever it may be located.

**Unilateral Kidney Hemorrhage Controlled by Injection of Human Blood Serum.** B. S. Barringer<sup>2</sup> reports a case treated successfully by the subcutaneous administration of human blood serum given at intervals of four and three days. The bleeding stopped promptly after the first injection of 20 c.c. The next dose given was 50 c.c., and the last 130 c.c. At the time of the report, the patient had been well for six months. Barringer believes that it might be well to inject a small amount of serum into the pelvis of the kidney by means of a catheter. He thinks that any serum, such as diphtheria antitoxin, might be used. In hemophiliacs, however, it should be given subcutaneously. He suggests that this treatment might be useful in that class of cases known as essential hematuria or renal papillitis. Further experience with this treatment is necessary before judgment can be pronounced upon it. It

<sup>1</sup> *Medicina Contemporanea*, October 27, 1912.

<sup>2</sup> *Journal of the American Medical Association*, October 26, 1912.

would probably be found of greater value in hemophiliacs than in other patients.

**Spirochetes in the Urine in a Case of Syphilitic Nephritis.** Vorpahl<sup>1</sup> discovered, in the centrifuged urinary sediment of a patient suffering from syphilitic nephritis, a number of spirochetes which he considered to be beyond doubt *Spirochaeta pallida*. The urine contained a large amount of albumin. The Wassermann reaction was positive, and the patient had a gumma of the pharynx.

**Dietetic Treatment of Suppurative Disease of the Urinary Tract in Infants.** The affection first described by Escherich under the name of "colon bacillus cystitis" has been made the object of much investigation, with the result that our conception of its nature has been somewhat changed. At present, the majority of clinicians believe that the principal seat of the trouble is high up in the urinary tract, particularly in the pelvis of the kidney. Likewise the view that it was due to an ascending infection has given way to the opinion that it is of hematogenous origin. That the colon bacillus is the sole cause of the trouble is not probable, other bacteria having been found associated with them, notably a certain form of diplococcus to which Finkelstein has called attention.

Formerly the treatment consisted principally in the use of large quantities of fluid and the administration of urinary antiseptics, but at present the method recommended by English physicians consisting in the administration of alkalies, such as citrate of soda, has been very generally adopted. This alkaline treatment was based upon the fact that the urine in these cases is almost always acid. Nothmann,<sup>2</sup> in a recent article, recommends the treatment highly, but in certain cases prefers a diet which tends to make the urine slightly alkaline. He uses a malt soup which is made of the following ingredients:

Milk	· · · · ·	$\frac{1}{3}$ liter
Water	· · · · ·	$\frac{2}{3}$ liter
Loefflund's soup extract of malt	· · · · ·	100 grams
Wheat flour	· · · · ·	50 grams

From 750 to 1000 grams of this preparation are given each day. The alkalinity of the urine produced by it is due to the high percentage of carbonate of lime contained in the extract of malt. This article of diet is reserved for children who are more than six months old and whose general nutrition requires improvement. By its use, the unpleasant effects of an alkaline drug treatment are avoided. Nothmann remarks that this is a matter of considerable importance and states that he has seen edema result from the daily administration of 3 grams of bicarbonate of soda, and also has known insomnia, diarrhea, and a loss of weight to follow the use of the citrate of sodium.

<sup>1</sup> Münch. med. Woch., December 17, 1912.

<sup>2</sup> Berlin. klin. Woch., September 23, 1912, No. 39.

**Constriction of the Ureters in Women.** From a careful study of the literature, as well as from his own observations, Furniss,<sup>1</sup> of New York, has concluded that stricture of the ureter in women is much more common than it is generally believed to be and that it is often mistaken for some other condition, especially when the right ureter is affected. The development of stenosis is slow, but constantly progressive, and eventually causes serious trouble in the kidney. Usually of inflammatory origin, the path of infection may be either ascending or descending. The most common cause the author has found to be a preceding pyelitis. When the stricture is sufficiently developed, the symptoms produced by it resemble those of an intermittent hydronephrosis or obstruction by calculus. In the majority of cases observed, the symptoms have persisted for a considerable time. At first the attacks occur at long intervals, but they become more frequent as well as more severe as the lumen of the ureter becomes more and more constricted. The location of the pain is in the lumbar region, but it has often been erroneously attributed to the passage of gall-stones or to acute inflammation of the appendix. Vesical symptoms may or may not be present. During an attack, oliguria, followed by polyuria, is often present; in fact, the functions of the kidneys may be seriously interfered with even when there is only a very slight degree of distention of the pelvis. By means of cystoscopy, catheterization of the ureters, and radiography of the renal pelvis it is possible to make a positive diagnosis before any irremediable tissue-changes have occurred.

### THE BLADDER.

**Tumors.** THE EFFECT OF IRRITATION AS A CAUSATIVE OR EXCITING FACTOR IN THE PRODUCTION OF MALIGNANT NEOPLASMS has received much consideration. In other branches of surgery we hear much of precancerous conditions—of malignant changes supervening upon segregated areas of epithelium in callous ulcers of the stomach, in the tip of the appendix after obliteration of its lumen, in diverticula of the intestine, and in scars of the cervix uteri. With reference to the genito-urinary organs, it may be mentioned that serosal cancer in chimney sweepers and paraffin workers has been attributed to the noxious influence of soot and paraffin. Also that the irritation, inflammation, and frequent laceration of the foreskin in the subjects of phimosis, particularly those of middle or old age, has been considered by some to be the cause of cancer of the penis. The transformation of benign into malignant tumors is not uncommon in the bladder. Probably from 4 per cent. to 10 per cent., and perhaps more, of hypertrophied prostates show cancerous areas. In this review reference has already been made

<sup>1</sup> Medical Record, December 21, 1912.

to the role played by renal calculi in the production of carcinoma of the pelvis of the kidney. A communication made during the year by Leunenberger,<sup>1</sup> of Basle, is of interest in connection with this subject. It treats of neoplasms of the bladder in dye-workers and comprises a study of all the cases which have been treated at the University Clinic in that city during the last fifty years. The investigation showed that vesical neoplasms are thirty times more frequent in anilin dye-workers in that part of the country than in people engaged in other pursuits. Vesical tenesmus almost always preceded the symptoms and signs of neoplasm, so it would seem that the chemicals exert an irritating effect upon the bladder mucosa for a long time before malignant tissue-changes take place. In this series of cases, as in others previously reported, it was only after years of exposure that the trouble manifested itself. At Basle it was only after the introduction of the newer synthetic dye-stuffs that the disease became so common. Various prophylactic measures have been adopted in different places to guard against the development of this disease in dye-workers, but it would seem that the one from which the most is to be expected will be short periods of work with the most poisonous dyes. In some parts of Germany, the employees are allowed to work with certain substances for only one year. It is interesting to note that Leunenberger considers a substance known as paramidophenol more dangerous than any of the anilin dyes.

In previous reviews reference has been made to the TREATMENT OF PAPILLOMAS WITH THE HIGH-FREQUENCY CURRENT. Beer,<sup>2</sup> who introduced this method, has published a comprehensive paper on the results obtained with it. He has a record of one hundred and eighty-seven cases in which it has been used in America, and twenty-eight others in which it has been used abroad. His first patients have remained free from recurrences. He states that the simplicity of the method, its freedom from danger, and the possibility of using it without confining the patients to the hospital make it the method of choice both for patient and surgeon. Its indications, however, are limited, and its author advises that it be not used in malignant tumors and in those which cannot be easily reached by the cystoscope. Among the latter are especially those which are situated near the vesical neck and which bleed when the cystoscope is passed into the bladder, thus making accurate work impossible. He also advises against its employment in patients who are intolerant of cystoscopy. A number of other surgeons have reported small series of cases during the year, and all speak highly of the method.

Judd<sup>3</sup> summarizes the results of the treatment of 114 cases of bladder tumors in the Mayo clinic, 2 of the tumors being benign, while the

<sup>1</sup> *La Semaine Médicale*, January 15, 1913.

<sup>2</sup> *Zeitschrift für Urologie*, 1912, Band vi, Heft 12.

<sup>3</sup> *Journal of the American Medical Association*, November 16, 1912.

remaining 112 were clinically malignant papillomas and carcinomas. For the purpose of comparing the duration of life in these cases when treated by different methods and the probable outcome when no treatment is instituted, he divides them into three groups, the first comprising those in which no operation was performed, the second those treated by transperitoneal operation, and the third those operated upon by the extraperitoneal route. The average period elapsing between the onset of symptoms and death, or the date of the report, in each case was: Class 1 (no operation), 26 months; class 2 (transperitoneal), 41.5 months, 18.5 months being the average time since the onset of symptoms at which operation was performed; class 3 (extraperitoneal operation), 46 months, the average duration at the time of operation being 24.4 months. The tumors operated upon by the extraperitoneal routes were, for the most part, less extensive than those for which the transperitoneal operation was chosen. The operative mortality of the transperitoneal operation was 10 per cent.; of the extraperitoneal, 3 per cent. Of the 30 patients who were operated upon transperitoneally, 3 have lived 5 years and 10 have lived 3 years, 12 are dead (1 from intercurrent condition), 13 are apparently well, 4 have recurrences, 1 not heard from. Of the 33 operated upon extraperitoneally, 4 have lived 6 years and 8 for 3 years; 14 are dead (1 from pneumonia), 15 are well, 1 has a recurrence, 3 have not been heard from.

Zuckerkandl<sup>1</sup> maintains that polypoid tumors of the bladder may cause retention of urine when the neoplasms are situated at the neck of the bladder. It is interesting, from the standpoint of diagnosis, to note that the first symptom of vesical neoplasm may be retention. Attention is called to the confusion which might exist between retention due to this cause and that due to hypertrophy of the prostate. Cystoscopic examination made early in the case will enable a direct diagnosis to be made. The author has seen three cases of this kind, in all of which the retention was relieved by the removal of the growth.

**Radiodiagnosis of Vesical Stone in Children.** Stone in the bladder produces such characteristic symptoms in adults that it is often possible to arrive at correct conclusions as to the nature of their trouble without making an examination, although of course no surgeon would be satisfied with a diagnosis which had not been confirmed by detection of a calculus with the stone sound or the determination of its presence by some other method. In children, however, symptomatology is not nearly so well pronounced, the patients themselves often not being able to answer the questions usually asked. Therefore, in this class of patients the objective signs become of paramount importance. In an interesting article on the subject, Ivanitski,<sup>2</sup> of Kiev, has enumerated the most constant sign and has also discussed the various physical methods to

<sup>1</sup> Münchener med. Wochschr., November 9, 1912.

<sup>2</sup> Vratchebnaia Gazeta, October 28, 1912.

be employed in making a diagnosis. He calls attention to shortening of the penis and the frenum, to eczema on the thighs, balanitis, epididymitis, incontinence of urine, and prolapse of the rectum, any or all of which should lead one to think of a vesical calculus in boys affected with urinary disturbances. Another important sign is tenderness to pressure in the perineum and in the suprapubic region. Given a child presenting such signs, how is its physician going to make a positive diagnosis? Catheterization and cystoscopy, especially the latter, are very painful in children, often require the use of chloroform and quite as often do not give any positive results. Radiography, however, has proved eminently satisfactory in a number of cases which have come under the author's observation. He presented sixteen radiographs at the Surgical Society of Kiev, and also the sixteen calculi shown by the pictures, which he had removed from the bladders of sixteen children. In four of these cases, the radiograph gave some idea of the composition of the stones. All of these little patients were operated upon through the suprapubic route. One died of tuberculous meningitis. Of the others, healing of the wound took place by first intention in eight, and by second intention in seven. The author ends his article with the following admonitions: "Don't torture children. Begin with radioscopy. If you do not find anything, then it is time to resort to the older methods of diagnosis."

With reference to *suture of the bladder* in children after the removal of stone, Grussendorf<sup>1</sup> considers it to be contra-indicated in children who, despite good general health, have suffered from much vesical irritation which has not disappeared after several days of rest in bed and local treatment; in children whose general health is not satisfactory, even though there be no fever nor other signs of infection; and in children in whom the vesical mucosa has undergone such alterations of texture or elasticity as to make it doubtful whether a purse-string suture will hermetically seal the opening in the viscus.

Werther<sup>2</sup> reports twenty-one *operations for vesical stones in children*, eighteen of which were performed upon those less than fifteen years of age, the majority being less than eight years of age, in which he practised immediate suture of the bladder in all except two cases. Cure was obtained in every case, and he attributes his success to the fact that he performed an external urethrotomy through which a sound of large caliber was introduced into the bladder, in order that that viscus might be satisfactorily drained and also copiously irrigated. A very severe cystitis is practically the only thing that he considers to be a contra-indication to immediate closure.

**Simple Ulcer of the Bladder.** In former times the existence of simple ulcer of the bladder was much discussed, but since perfection of the

<sup>1</sup> Münch. med. Wochschr., December 17, 1912.

<sup>2</sup> Ibid., January 21, 1913.

cystoscope has rendered the diagnosis of intravesical lesions more satisfactory, its reality has been plainly demonstrated, inasmuch as loss of continuity in the vesical wall has been found in patients in whom no cause for its occurrence could be determined. The origin of such lesions has been attributed to trophic, toxic, infectious, or embolic disturbances.

In commenting upon two cases which recently came under his observation, Leo Buerger,<sup>1</sup> of New York, expresses the opinion that ulcers on the posterior wall of the bladder may easily escape detection, as both of his patients had been previously cystoscoped and the lesions had not been found. This circumstance perhaps well illustrates Casper's statement that skilful cystoscopy will always remain the trick of the few. As to treatment, Buerger recommends fulguration, mercurial injections, and excision of the ulcer-bearing area, according to the circumstances obtaining in the individual case.

A case recently reported by H. Le Fevre,<sup>2</sup> of Bordeaux, is interesting, particularly as the ulcer perforated into the peritoneal cavity just as an ulcer of the stomach or duodenum often does. The case was that of a woman, aged fifty-eight years, who entered the hospital for a large strangulated femoral hernia. At the operation it was necessary to resect a large portion of the omentum. Convalescence was normal, and the wound healed by first intention. Twenty-three days after the operation the patient felt a sharp, sudden pain in the abdomen just as she was about to void urine and was unable to pass a single drop. For an hour she had a pressing desire to empty her bladder, but was unable to do so. The tenesmus then subsided. It was five hours after the beginning of the attack that Le Fevre first saw the patient. Her pulse was 100, her temperature 37° C., and she complained of abdominal pain, which was most severe in the suprapubic region. It was thought that the trouble might be due to inflammation of the resected omentum or to the formation of a late abscess accompanied by retention of urine. Ice was applied to the abdomen, and the catheter passed into the bladder. One thousand grams of clear urine were evacuated. No urine was passed spontaneously, but, in the evening, five hundred more grams were removed with the catheter. The next day the abdominal pain had become much less severe, although the facial expression of the patient was very bad. Her eyes were sunken, she was pale, the tongue was dry and red, the pulse small and beating at the rate of 120 times a minute; the temperature was 36.6 Centigrade and a considerable degree of dyspnea was present. The abdomen was more distended than it had been the preceding day. Six hundred grams of clear urine were drawn with the catheter. The patient's condition became progressively worse, and she died in coma late in the evening. Autopsy revealed

<sup>1</sup> American Journal Urol., March, 1913

<sup>2</sup> Journal d'Urologie, January 15, 1913.

a perforation of the bladder into the peritoneal cavity. The perforation was on the posterior wall near the summit and close to the median line of the abdomen. The author believes that the ulcer was due either to a thrombus or to an infection dating from the strangulation of the femoral hernia.

Legueu<sup>1</sup> has also had a case in which perforation occurred with fatal result. He now advises resection instead of cauterization.

**Foreign Bodies.** Having observed a case in which a *sequestrum* from one of the pelvic bones had penetrated the bladder, G. Küss,<sup>2</sup> of Paris, investigated the subject, but was able to find only twenty cases reported in literature, eight of which were in men and two in women. In ten, the sequestrum was derived from pelvic bones affected with osteomyelitis or osteitis, five of the number coming from the pubis. In nine, it was derived from the acetabulum, and, in one reported by Buxton Brown, multiple sequestra came from the dorsal and lumbar vertebrae. Perforation of the bladder by these fragments of bone results from the intimate relation of tuberculous abscess with the viscera, an ulcerative process taking place. The contents of the whole abscess may first discharge itself in this manner, later to be followed by discharge of fragments of bone. In some cases, the sequestrum had apparently produced no disturbance until cystitis has developed. In some, too, the phenomena of inflammation have been absent for a considerable time, the sequestrum becoming encrusted with urinary salts and forming the nucleus of a calculus. Small sequestra have been expelled through periurethral abscesses. Infiltration of urine and fistulae resulted in eight cases in which the sequestrum was too large to be passed through the natural channel. In eight cases in which sequestra were passed into the urethra, it was possible to abstract them through the natural channel in three. In the other five, external urethrotomy was necessary, one of these patients succumbing. In fourteen cases in which the sequestrum remained in the bladder, either in its original condition or as the nucleus of a calculus, crushing operations were practised in seven, resulting in five cures, one relapse and one death. In five, suprapubic cystolithotomy was performed, the result being three cures and two deaths.

H. Abels,<sup>3</sup> of Vienna, has reported two interesting conditions in children arising from the presence of *foreign bodies in the bladder*. One was that of a little girl, seventeen months old, who suddenly developed the phenomena of severe cystitis, which were soon followed by pyuria associated with fever and other constitutional disturbances. The diagnosis was doubtful until the child passed a *hair* twenty-five centimeters long, which was shortly followed by the passage of particles

<sup>1</sup> Progrès Médical, 1913, No. 19.

<sup>2</sup> Travaux de Chirurgie Anatomo-Clinique, H. Hartmann, 1913.

<sup>3</sup> Wien. klin. Wochschr., 1912, No. 46.

of *paper* and *wool*. After these foreign bodies had been expelled, cure took place. The second case was that of an infant nine months of age, in which an abundance of *starch granules* and *vegetable fibres* were passed. In both cases it was subsequently learned that foreign substances had been introduced into the infants' bladder by nurse girls.

**Pseudotrichiasis of the Bladder.** This relatively rare condition has recently been made the subject of an exhaustive investigation by J. Heller,<sup>1</sup> of Berlin, who succeeded in collecting sixty authentic cases, to which number he has added one that came under his own observation. In women, the most usual cause seems to be the rupture of a dermoid cyst of the ovary into the bladder after adherence has taken place. It is very interesting to note also that paravesical dermoid cysts have been found having no connection whatsoever with the ovary. In men, the condition may be due to the presence of sub-peritoneal dermoids which eventually invade the bladder. The passage of hair with the urinary stream is an inconstant symptom. In the cases in which it occurs, it is always associated with vesical inflammation, tenesmus, and frequency of urination. In men, the condition is found associated with calculus. The symptoms are most pronounced. Heller's case is the first one in which a cystoscopic diagnosis has been made. The prognosis depends upon the time at which diagnosis is made, the difficulty of the operation, and the general condition of the patient. The treatment is purely surgical and consists in removal of the tumor. The removal of the calculi is at best only a palliative operation, for the reason that others will form around the masses of hair.

**Extrophy of the Bladder.** In last year's review, the Heitz-Boyer-Hovelacque operation was described in detail and the results obtained in two cases were stated. At the meeting of the Surgical Society of Paris, February, 1913, Gosset<sup>2</sup> presented a patient, aged nineteen years, upon whom he had operated December 2, 1912. Three operations had been done previously at the ages of eight, fifteen, and sixteen years respectively, but all were failures. Gosset followed the exact technique as recommended by Heitz-Boyer and Hovelacque. The operation was done in one stage. At the time the patient was shown before the Society, he could hold his urine during the day without any difficulty, and only on two occasions had there been an involuntary escape of urine during the night.

**Intradural Anastomosis of the Spinal Nerve Roots for the cure of Paralysis of the Bladder.** Charles H. Frazier and Charles K. Mills,<sup>3</sup> of Philadelphia, have reported a unique and interesting case in which this operation was done for the relief of vesical and rectal incontinence. They believe that their case is the first in which such a procedure has

<sup>1</sup> Zeitschrift für Urologie, 1913, Band vii, Heft 1.

<sup>2</sup> Bull. Mem. Soc. Chir. Paris, February, 1913, vol. xxxix, No. 5.

<sup>3</sup> Journal of the American Medical Association, December 21, 1912.

been tried. It was that of a man, aged twenty-seven years, who, on July 6, 1911, sustained an injury which resulted in paralysis of the lower extremity, together with vesical and intestinal paralysis. As time went by, the extremities and also the bowels, with the exception of intermittent loss of control over the sphincter of the anus, regained their tonicity. The vesical paralysis, however, remained the same, there being a condition of total incontinence and associated cystitis of severe degree. There was a partial anesthesia of one extremity, together with absence of certain reflexes. The patient's condition was attributed to involvement of the fifth lumbar nerve root, and of the first three sacral and possibly also of the last two.

On February 29, 1912, a laminectomy was performed and an intradural anastomosis made between the first lumbar and the third and fourth sacral nerves. The twelfth dorsal and first and second lumbar vertebrae were resected, the second lumbar being found fractured. The dura seemed more tense than normal, and when it was opened a considerable quantity of cerebrospinal fluid flowed out despite the fact that the patient was in the Trendelenburg position with his head considerably lower than his pelvis. No gross changes in the cord could be detected. The authors had intended to make an anastomosis between the twelfth dorsal and the third and fourth sacral nerves, but as the root of the twelfth dorsal was found too short to be brought down, the first lumbar was used instead. The nerves were identified by means of electric stimulation. After they had been thus identified, tampons saturated with 4 per cent. stovain solution were placed against the spinal cord in order to prevent contractions. The identification of the different nerve roots proved to be easier than the authors had expected. The operation, however, was long and tedious, but without any real difficulties. During the latter part of it the patient's respiration became feeble, so that it was deemed advisable to change his position and to administer stimulants.

The dura mater was sewed up with a continuous suture, the aponeurosis was closed with catgut, and a small drain of iodoform gauze was placed in the wound to prevent oozing from the vertebral veins.

On March 4, the patient had some feeling in his foot and stated that he felt as though he might be able to hold his urine. On March 22, he experienced the sensation of vesical distention, but could take only ten ounces of boric acid solution injected into the bladder. Eight months later he was able to do away with his urinal for twelve hours. He was obliged to make pressure over the region of the bladder, however, to obtain a partial evacuation of the urine. Seen at a later period his condition was found to be still better, and the authors look forward to a progressive amelioration for some time to come. This case is certainly an interesting one. It is to be hoped that patients affected in the same way as the patient operated upon by the

authors will be subjected to similar procedures. It is upon such undertakings that true advances in surgery are founded, and even though the result of this case seems far from perfect, the operation merits attention, study, and further practice.

**Treatment of Incontinence of Urine in Women.** A new operation for incontinence, involving suture of the lacerated fibers of the vesical sphincter, has been recently described by Howard A. Kelly.<sup>1</sup> A Pezzer sound is introduced into the bladder and with the index finger placed against the anterior vaginal wall, a little manipulation makes it easy to locate the neck of the bladder. When the position of this part of the viscus has been determined, a longitudinal incision an inch long is made on the anterior surface of the vagina. The vaginal wall is then carefully separated from the ureter and from the bladder. When this dissection has been made, it will often be observed that the vesical musculature has been lacerated, so that only the mucous membrane of the bladder and vagina are intact. The method of repair consists in placing two or three silk or linen sutures in the ends of the torn musculature perpendicularly to the neck of the bladder, taking care not to include any of the superior part of the viscus in the sutures. Before any sutures are tied, the catheter is removed. Two or three superficial sutures are then put in.

**Pathology and Treatment of Proliferating Cystitis Colli.** This affection is almost always encountered in women. At the meeting of the Russian Urological Society in February, 1912, Gorditsch,<sup>2</sup> of St. Petersburg, reported a case occurring in a man. The patient had been affected with chronic gonorrhea for eight years and had been treated by the usual methods employed in this disease, such as instillations and dilatations. The most prominent symptom was diurnal frequency of urination, which diminished if the patient remained quiet, either in the sitting or the dorsal position. Cystoscopic examination showed that the vesical neck was the seat of numerous villosities. The urethroscope also revealed a number of polypoid excrescences in the posterior urethra. First, irrigations of albargin, one to three hundred, were used. Later the vegetations were destroyed in two seances with the galvanic current, which was used through the urethrocystoscope of Wossidlo. The patient experienced no reaction whatever from the treatment, and cystoscopic examination made some time later showed that the excrescences had disappeared from the vesical neck.

**Death from an Air Embolism after Injection of Air into the Bladder.** Nicolich,<sup>3</sup> of Trieste, reports a case of a man, aged seventy-three years, who entered the hospital because of complete retention of urine caused by hypertrophy of the prostate. After a course of preliminary treat-

<sup>1</sup> Therapeutic Gazette, October, 1912.

<sup>2</sup> Zeit. für Urologie, February, 1913.

<sup>3</sup> Journal d'Urologie, January, 1913.

ment, preparations were made to do a suprapubic prostatectomy under stovain spinal analgesia, the bladder being filled with air according to the method routinely employed by the author. After an injection of 180 cubic centimeters, the patient complained of nausea, was seized with a violent attack of coughing, and after a few seconds his pulse and respirations ceased. It being thought that the stovain injection was the cause of these phenomena, recourse was had to the measures usually employed to counteract the action of that drug, but they were all futile. As only three centigrams of the drug had been used, Nicolich could not persuade himself that so small a dose was responsible for so sudden a death, especially as he had used it in more than four hundred operations upon the urinary tract without a single death. Autopsy was performed eighteen hours after death. Considering the possibility of an air embolism, evidences of such an occurrence were carefully sought for. The ascending aorta and inferior vena cava were ligated and the heart removed and put into a large vessel of water, after which an incision was made in the right ventricle, with the result that a large air bubble, followed by several smaller ones, came up to the surface of the water. Small air bubbles floating on the blood contained in the abdominal portion of the vena cava were also observed. The mucous membrane of the bladder presented the lesions of chronic cystitis, with areas of hemorrhagic discoloration, especially near the neck. In the prostatic urethra, dilated veins were found. Both lobes of the prostate were hypertrophied. The kidneys were not badly diseased. The author believes that the postmortem findings proved beyond question that his patient was killed by an air embolus, the air which he injected into the bladder having entered either the veins of the prostate or of the bladder. He could not, however, find the point of entrance. This unfortunate case shows the danger of distending the bladder with air. A similar case has also been reported by Marion, of Paris.

**Cystoscopic Errors.** F. Weisz,<sup>1</sup> of Budapest, in a very interesting communication, has called attention to some common errors that even those skilled in cystoscopy may make. In chronic cystitis the vesical mucous membrane may be so thickened in places and even present vegetations, that mistakes may be made and a tumor diagnosed when in reality none exists. Tumors of the prostate which push the mucous membrane of the bladder up may also be mistaken for lesions within the viscus. In one instance, the author mistook a blood clot for a tumor, and mentions a similar mistake recorded by Casper. Tumors encrusted with phosphates may be mistaken for calculi.

#### THE PROSTATE.

**Hypertrophy.** Among the contributions made to this subject during the year I have found comparatively few of much practical importance.

<sup>1</sup> *Zeitschr. für Urologie, Band 6, H 11.*

The etiology of the condition continues to be discussed, but nothing convincing has thus far appeared. Such subjects as changes in the prostatic secretion accompanying hypertrophy of the gland and the mechanism of retention may be of scientific interest, although they hardly attract more than passing notice from the practical physician and surgeon. Certainly it would be beyond the scope of this review to do more than allude to them.

I have been impressed with the number of references to the two-stage operation, which received ample consideration in last year's review. A number of surgeons, in reporting a few cases of prostatectomy, state that some of them were done by this method. There also seems to be an increasing amount of attention given to the preparatory and post-operative treatment of patients. The subject of anesthesia likewise is receiving continued attention and various efforts are being made to lessen the danger of the operation by endeavoring to secure better methods of inducing anesthesia. In an important contribution to this subject made by Grandjean,<sup>1</sup> of Paris, who discusses it in all its phases, it is pointed out that there is no method of local anesthesia which satisfactorily renders painless the most serious part of the operation, namely, the enucleation of the prostate itself. Therefore he recommends a general anesthetic in this portion of the operation even though the first stages be done by successive infiltration of the different planes of tissues leading down to the prostate. Grunert<sup>2</sup> likewise completes the operation under chloride of ethyl anesthesia, keeping his patients under on an average of not more than two minutes. He states that this has proved decidedly advantageous. The patients are able to begin to take water by mouth and retain it within an hour after they leave the operating room. With reference to anesthesia, I may state that both observation and experience, not only with genito-urinary operations but even to a greater extent with those in general surgery, have led me to believe that there are really very few patients, irrespective of age, who cannot take ether safely when it is given by the drop method by a thoroughly competent anesthetist. Of course many of the subjects of prostatic hypertrophy, especially those who have been allowed to go too long without operation, are the worst possible subjects for general anesthesia; yet many of them do take ether by the drop method with safety and with less shock than would result from the mental apprehension and fright incidental to being operated upon while they are conscious. In those cases in which positive contra-indications to general anesthesia are present, then it would seem that the method of inducing analgesia should be selected in accordance with the requirements of the individual case instead of the case being fitted to the method. In some cases, a preliminary cystotomy under local anesthesia,

<sup>1</sup> Rev. Prat. des Mal. des Org. Gen. Urin., May, 1913.

<sup>2</sup> Zeitschr. für Urol. Chir., June, 1913.

followed by enucleation under gas and oxygen at a later period, may impress the operator as being the most desirable, in others combined local and general anesthesia, as advocated by the authors just quoted; and possibly, in an occasional case, of spinal analgesia, although with reference to this method I am exceedingly dubious.

Von Verrére,<sup>1</sup> of Lyons, reports 37 cases of acute retention in subjects of prostatic hypertrophy which were cured by catheterization; 13 of these came under his own observation, and 24 were treated in the service of Professor Rafin. The author attributes no importance to age as far as the prognosis is concerned. The treatment must be carried out for at least six weeks, he states, and if catheterization becomes difficult or attended with much suffering, it must be temporarily replaced by suprapubic puncture of the bladder. Preference is given to a Nélaton catheter of the caliber of 16 or 18 French. The instrument is to be used only under aseptic precautions, and after the urine has been withdrawn the bladder is washed out with boric acid solution, weak permanganate solution, or sterile water. The author condemns the use of strong solutions in these cases. Some fluid is always left in the bladder. The catheterization is repeated as often as the patient feels the desire to urinate, and it is stated that it is not unusual to catheterize some patients as often as every four hours. In cases of polyuria, the catheter may be fastened into the bladder over night, and in infected cases associated with fever, as well as in those in which ordinary catheterization is persistently painful, permanent catheterization is considered the method of choice. Urotropin is administered throughout the course of the treatment.

This paper is an interesting one in that it shows what may be accomplished by palliative treatment, and I cannot but feel that the lives of many old men would have been prolonged had such measures been used at least for a while before they were rushed off to a hospital and operated upon. I have a number of patients of advanced years who have been successfully carried through one or more attacks of retention by having just such treatment as Verrére describes, and I am sure that some of them would have long since been in the cemetery if they had been injudiciously operated upon at the time of their retention.

Grunert considers acute complete retention to be an absolute contraindication to operation. In cases in which the bladder empties itself through the catheter, he employs continuous catheterization for a number of days, even as long as two weeks, washing the bladder out several times a day and irrigating the urethra every second or third day. The catheter is changed at the time of the urethral irrigations. During this treatment he gives large doses of urinary disinfectants. In cases which progress favorably, he removes the catheter at the end of a week, injecting 30 c.c. of 2 per cent. boroglyceride solution into the bladder

<sup>1</sup> Rev. Prat. des Mal. des Org. Gen. Urin., January, 1913.

when it is taken out. This is in accordance with the recommendation of Frank, which was mentioned in this review three years ago, and is used for the purpose of producing vesical contractions. If spontaneous micturition does not ensue, the catheter is put back into the bladder for another week. If the patient begins to urinate, however, catheterization is practised during the next few days immediately after the completion of the act in order to determine the amount of residual urine. If it does not increase and the patient experiences no trouble, operation is not considered unless another attack of retention takes place. If the residual urine increases, then the radical operation is advised, provided that no contra-indication be present.

In cases in which the bladder does not empty itself through the catheter, suprapubic cystotomy is performed under local anesthesia, and a large drainage tube is introduced into the bladder. Then the same treatment is carried out through the suprapubic opening as is given in the other cases through the catheter. When the patient's condition permits, prostatectomy is performed.

In discussing the indications for non-operative and operative treatment, Grunert states that he advises operation in all cases in which four or, at most, six weeks of intelligent conservative treatment does not control subjective symptoms, reduce the amount of residual urine, or bring about improvement in both respects. He also advises operation in cases in which repeated attacks occur.

He has performed the suprapubic operation sixty-seven times. All of the patients left the hospital with good control over their bladder. A few of them had suprapubic fistulas, some of which closed spontaneously and some of which required secondary operation. As the author mentions only three patients out of this number who were not living at the time the paper was published, two of whom died nine months after the operation of marasmus and renal tumor respectively, and one one and one-half years after the operation of apoplexy, it seems that he had no operative mortality. This paper of Grunert is one of the best which I have read during the year, and for that matter one of the best I remember ever having read. He takes up the subject from every standpoint, and I heartily commend his paper to all those who are interested in the subject of prostatic hypertrophy.

Andrew Fullerton,<sup>1</sup> of Bristol, has reported a series of fifty-five suprapubic prostatectomies, four of which were fatal. This gives a mortality rate of 7.2 per cent. which is to be considered very good for the average operator, the general surgeon who does these operations as part of his routine work. As stated in last year's review, the mortality rate of operators particularly skilled in either the suprapubic or perineal operations, such as Freyer and Young, for example, cannot be accepted as the standard.

<sup>1</sup> British Medical Journal, February 15, 1913.

Mr. Fullerton's patients varied in age from fifty-three to eighty years, and it is probable that he took them as they came without making any special selection, and giving every patient who did not present distinct contra-indications to surgical intervention the possible benefit of an operation. The causes of death in these cases were uremia, acute sepsis, poisoning from the induction of spinal analgesia, and perinephric abscess resulting fatally six weeks after the operation. Thus, it would seem that one of these fatalities should not be attributed to the operation itself, so that the actual mortality rate may be considered to be 5.4 per cent. In two cases, microscopic examination of the gland showed malignancy, although macroscopically it seemed to be benign. In two cases, incontinence persisted; and in one, a suprapubic fistula. The most important complications which supervened were hemorrhage, which almost invariably occurred during the first forty-eight hours after the operation; shock, which the author believes can be reduced to a minimum by rapid operating; hypostatic congestion of the lungs; epididymitis and orchitis; deposit of phosphates in the suprapubic wound and in the bladder, together with the occasional formation of vesical calculi; incisional hernia and, in one case, hematemesis. The author likes to operate under chloride of ethyl general anesthesia when ever it is possible to do so, as he believes that it is better than ether anesthesia.

It seems to me that the study of a series of cases of this kind is extremely interesting and instructive. It shows what the average operator may expect in dealing with the average case of operative prostatic hypertrophy by the suprapubic route. Certainly Mr. Fullerton is to be congratulated upon his mortality rate.

Mr. Freyer<sup>1</sup> has reported a series of 236 cases of suprapubic prostatectomy performed during the years of 1911 and 1912, in which there were 11 deaths, making a mortality rate of 4.6 per cent. He summarizes the operations which he has done up to the end of 1912. In all, there were 1036. The ages of the patients varied from forty-nine to ninety years, there being 65 between the ages of eighty and ninety. It is stated that many of the patients were in very bad condition at the time of operation and that some were really moribund when they were placed upon the table. With reference to this latter class, the question arises as to why they were operated upon at all. The mortality rate in these 1036 operations was  $5\frac{1}{2}$  per cent. It diminished from 10 per cent. in the first 100 cases, to  $4\frac{1}{2}$  per cent. in the last 400. The author states that if the patients had been carefully selected, his mortality rate would have been "infinitesimal."

16 cases of suprapubic prostatectomy have been reported by Guiiani.<sup>2</sup> He had 2 deaths, 1 from embolism on the ninth day, and 1 from an infected arthritis two months later. The latter patient had suffered

<sup>1</sup> Lancet, April, 1913.

<sup>2</sup> Lyon Médical, February 2, 1913.

from retention for fourteen years. His urine was purulent at time of operation and he also had vesical calculi; 6 of the patients were operated upon in two stages, and the greater number were treated by regular catheterization for some time before they were subjected to operation. The author states that those who were operated upon in two stages did better than the others. This opinion is entirely in accord with recent experience with the two-stage operation.

**Tuberculosis.** An exhaustive study of this subject has been made by Arthur Goetzl,<sup>1</sup> of Prague. Although admitting the possibility of a primary tuberculosis of the prostate, he is of the opinion that its existence cannot be accepted in the light of our present knowledge. The most probable way in which primary infection can take place he believes to be through the use of infected catheters or sounds.

Secondary infection may be either hematogenous or lymphatic, or may take place by contiguity. When infection takes place through the blood-stream, the prostate may be only one of several organs to be infected or it may be the sole recipient of the tubercle bacilli. Lymphatic infection always follows the direction of the lymph stream, and infection by contiguity results from disease in the seminal vesicles, epididymes, or kidneys.

The disease occurs most frequently in the period of active sexual life, although cases have been observed in early infancy and advanced old age. Chronic gonorrhreal infection of the posterior urethra is considered to be the most common cause, the cases resulting from this condition exceeding by far those which are due to the other causes, such as trauma or excessive coitus for instance. The author insists that every beginning urethral discharge in which gonococci are not present should be examined for the tubercle bacillus, and that, if necessary, guinea-pigs should be injected with it. Likewise a very persistent urethral discharge in which the gonococci have disappeared should arouse suspicion of a possible beginning tuberculosis of the prostate and lead one to make a careful search for the presence of tubercle bacilli. He insists also that every case of prostatitis which is of a subacute or chronic type from its beginning should also arouse suspicion of tuberculosis, especially in subjects predisposed to the disease, and that the prostatic secretion should be examined for the bacillus of Koch.

With reference to treatment, it is stated that the best results have been obtained by radical operation, and the author believes that when an early diagnosis can be made, the patient should be subjected at once to perineal prostatectomy. In advanced cases, when a prostatectomy is not practicable, some relief may be obtained by ligating the vasa deferentia. General systemic treatment, local palliative methods, injections into the substance of the gland, and tuberculin treatment have all failed.

<sup>1</sup> *Folia Urologica*, March, 1913.

**Abscess.**—Morelli<sup>1</sup> has reported a case of abscess of the prostate which occurred in a man who had never had gonorrhea and in whom no signs of tuberculosis could be found. The symptoms came on suddenly, the local trouble being associated with constitutional disturbances. There was sharp pain in the perineum, together with difficult, painful micturition, constipation, and fever. The urine was purulent. Rectal examination revealed a large fluctuating mass in the prostate. After the operation, about half a glass full of greenish pus was evacuated. Cultures from it revealed the presence of the streptococcus. Inasmuch as the patient had not had any of the acute infectious diseases nor furunculosis, and had been free from venereal disease, the author concluded that the case was one of primary prostatic abscess.

Although prostatic abscesses generally follow urethral infection, they may occur as a complication of systemic disease, such as typhoid fever, variola, or septicemia. Motz<sup>2</sup> has seen a case arising from an infected finger. Lesions in the anal region also may produce periprostatic inflammation, which may extend to the prostate itself and lead to suppuration within the gland. This form, however, is probably even rarer than the metastatic form. Abscesses due to urethral infection, principally gonorrhea, frequently evacuate themselves spontaneously through the urethra. For instance, out of thirty-three cases mentioned by Hartman,<sup>3</sup> fifteen broke in this way. Those developing in the direction of the rectum or seminal vesicles are the ones which are most likely to demand surgical intervention, although periurethral abscesses likewise may require it. With reference to the latter, Motz points out that those caused by unskilful instrumentation and the making of false passages should be opened promptly, believing that it is better to attack them early with the scalpel than to wait too long for them to break. This view is certainly based upon sound principles. The same rule should invariably be applied in the treatment of abscesses associated with hypertrophy of the gland, both because of the altered condition of the structure involved, and the usually reduced physical condition of the patients. Owing to increase in the adenomatous elements of the gland they cannot easily reach the urethra, and hence tend to point toward the rectum and to produce a periprostatitis, with the consequent increased danger of periprostatic phlebitis and septicemia.

With reference to the surgical treatment of prostatic abscess, it would seem that a great many can best be evacuated through a transverse perineal incision. An operation thus performed is a clean surgical procedure, does not involve the rectum, and gives good access to the diseased area. Some surgeons, Motz among the number, continue to operate through the rectum when the abscess is so situated that it

<sup>1</sup> Rev. Ospedaliera, February 15, 1913.

<sup>2</sup> Rev. Clin. d'Urol., January, 1913.

<sup>3</sup> Travaux Chirurgie Anatomique Clinique, Sér. 4, Voies Urinaires, 1913.

bulges into that part of the bowel. If there be a communication between the abscess and the urethra, drainage through the rectum should never be made because of the danger of a resulting urethrorectal fistula.

In discussing the operation, James A. Day<sup>1</sup> very appropriately states that it is impossible to establish any fixed rule for opening these abscesses. Ordinarily he prefers a straight perineal incision, although in some cases he has found that a more extensive dissection is necessary than can be made through such a cut. In some, too, especially those associated with partial rupture of the urethra and severe infection of the bladder, he favors the method of the late Samuel Alexander, which consists in opening the prostatic urethra as well as the abscess, thoroughly curetting the latter, and even removing the prostate if extensive destruction of its substance has taken place. Removal of the prostate under such circumstances has never appealed to me as being a rational, much less a life-saving, operation. It opens up far too vast an area through which infection can take place. Thorough evacuation can be secured in such cases by a wide dissection through a transverse perineal incision made from one tuberosity of the ischium to the other. The bladder can also be drained through a slight modification of this incision.

Day's own method of operating is as follows: With a finger in the rectum to act as a guide, an aspirating needle is introduced into the most prominent part of the abscess. An incision is then made through the skin and fascia of the perineum, and a gorget is passed in along the needle. The needle is then removed and a hemostatic forceps, the blades of which have been sharpened and the tips finely pointed, is carried into the abscess along the groove of the gorget and widely opened. If this be impossible, a long bistoury is used through the gorget and the opening into the abscess enlarged, after which a dressing forceps or a dilator is passed in to separate the tissues widely and permit evacuation of the abscess and curettage of its walls. This procedure is ingenious and no doubt is sufficient in the class of cases in which the author employs it. For extensive suppuration, particularly when multiple abscesses are present, it would hardly suffice.

#### URETHRA AND PENIS.

**Plastic Operation for Urethrorectal Fistula.** Michon,<sup>2</sup> of Paris, describes an operation for this condition which consists in the transplantation of a cutaneous flap into the perineum, the skin surface being turned from the urethra. The transplanted flap serves as a partition between the openings in the two channels. It also prevents the formation of perineal fistula and provides the urethra with a wall which has no tendency to contract. One patient, operated upon by Michon five years ago, can now take a No. 44 Beniqué sound.

<sup>1</sup> Urologic and Cutaneous Review, April, 1913.

<sup>2</sup> Journal d'Urologie, November 15, 1912.

The operation is done in three stages. In the first stage, a cutaneous flap is cut from the median portion of the scrotum after the hair follicles have been destroyed some time before. This flap must be of sufficient length so that it can be drawn down into the perineum without any difficulty, both anterior and posterior attachments being preserved. At the end of five or six days, however, the posterior one is divided. The second stage of the operation consists in making a transverse



FIG. 22

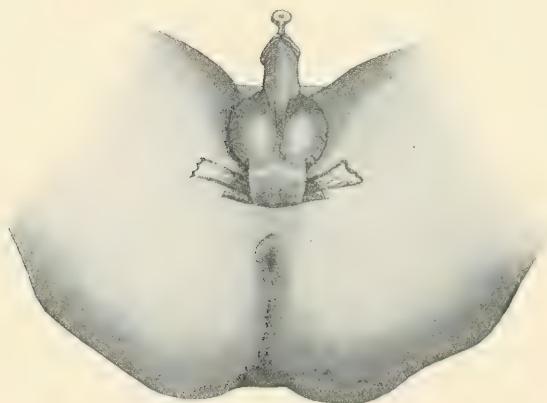


FIG. 23

incision in the perineum similar to the one employed for prostatectomy. The tissues are separated up as far as the prostate, the skin flap is then drawn into the wound, its raw surface in front, its cutaneous surface behind, its posterior extremity being fixed below the opening in the urethra and to the lateral part of the wound. Adhesion of the flap to the anterior part of the wound is prevented by interposing some gauze between the two. The wound is packed. At the end of two weeks, section of the scrotal pedicle is begun. It is done in several stages,

however, so as not to interfere with the blood-supply of the flap. In the third stage, the flap is turned so that its raw surface shall come in front in order to reconstitute the floor of the urethra. The lower margin of the flap is pushed back as far as possible and affixed to the posterior surface of the prostate and to the soft parts surrounding it. The perineum is then sutured over the entire mass. This stage is difficult, the flap having a tendency to become displaced downward by the force of



FIG. 24

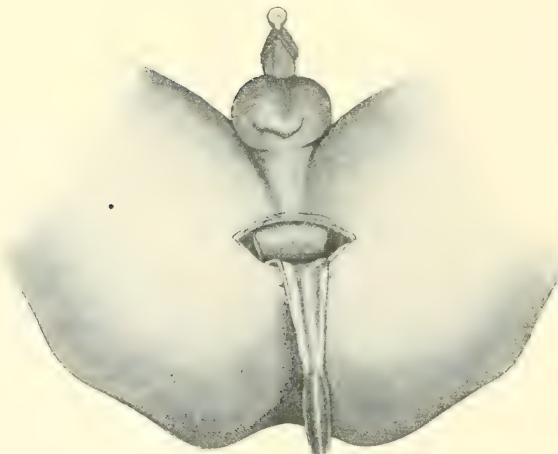


FIG. 25

the urinary stream, so that good union does not take place behind the prostate and on the sides of the deep perineal wound. Such an accident predisposes to the formation of fistula. In two cases in which this operation was performed, the results were highly gratifying.

**Urethral Hemorrhage Due to Varices of the Urethra.** At the last meeting of the French Urological Association, Aversenq,<sup>1</sup> of Toulouse, reported

<sup>1</sup> Proces-verbaux, de l'Assn. Française d'Urologie, 1912.

an unusual and interesting case of urethral hemorrhage due to the above-mentioned cause. The patient was a man, aged twenty-five years, who was affected with a continuous terminal hematuria, two or three drops of blood coming away after each micturition. In the intervals, no blood appeared except when it was pressed out of the urethra. The patient had no pain whatever. Fatigue did not seem to increase the loss of blood. Neither did coitus. The patient also stated that he had three or four attacks of nose-bleed each year, which was generally associated with a coryza. There was nothing in his history to throw any light upon the nature of his affection. Inspection showed a number of varicosities of the penis, the dorsal vein particularly being very large and tortuous. The extremity of the glans and meatus were of a dark blue color, owing to small varices. Palpation showed that this varicose condition involved the entire genitocranial system. The patient had small bilateral varicocele, and the veins of the scrotum were all dilated. The prostate was found to be normal, and the secretion did not contain any blood. Urethroscopic examination showed the entire length of the urethra to be covered with blue spots due to dilated venules. They were particularly well marked in the region of the bulb. The posterior urethra seemed congested, but there were no varicosities present. Cystoscopy showed the bladder to be apparently normal. Treatment consisted in cauterizing the little varicosities with the galvanic current, used through the urethroscope. In all, four treatments were given at intervals of a week. Improvement was observed after each treatment, and the blood began to diminish immediately after the first one.

**Abortive Treatment of Gonorrhea.** Inasmuch as the location of the gonococci is at first superficial in acute urethritis, various methods having for their object the destruction of the microorganisms before they reach the deeper strata of the urethra have been employed. The consensus of opinion is that the prevention of severe inflammatory phenomena and possibly a shortening of the duration of the disease is the most that can be expected from this form of treatment. From time to time, however, optimistic communications continue to be made. The method of irrigating with potassium permanganate solution, introduced by Janet,<sup>1</sup> of Paris, still has some advocates, especially in France, although the original method has been variously modified. In a recent communication upon the subject, Janet himself states that he has given up the permanganate treatment and now uses combined irrigations and injections of argyrol in its place. As a rule, the treatment is not employed in cases seen later than twenty-four hours after the very first symptoms manifest themselves, although occasionally it has been resorted to in cases of longer duration. Two treatments are given daily for three days. The anterior urethra is first irrigated with a pint of argyrol solution, 1 to 400, then is filled with a 10 per cent. solution

<sup>1</sup> Journal d'Urologie, June 15, 1913.

of the same salt, which is injected with an ordinary hand syringe and retained for five minutes, after which it is allowed to flow out and the meatus covered with a piece of cotton which is held in place with a thread. The patient is instructed to hold his urine as long as possible. As first stated, this treatment is given twice a day, but if a strong solution produces much irritation it is reduced to the strength of 10 per cent. or even 5 per cent., and it may also be necessary to reduce the strength of the irrigation. Janet states that if the method is going to prove successful, gonococci will not be found in the secretion after the first treatment. If he finds any at the second microscopic examination, he abandons the method at once and resorts to the usual treatment with permanganate of potassium irrigations. He states that in ninety-eight cases treated with combined irrigations and injections of argyrol the disease was aborted in forty-seven.

One great difficulty of applying any form of abortive treatment to specific urethritis lies in the fact that, as a rule, patients are not seen until their inflammation is well developed. Even in cases in which they come under observation at the very inception of their disease, statistics of those most enthusiastic in regard to the value of the treatment show less than 50 per cent. of "cures." Time and again when I have endeavored to cut short the disease, I have seen relapses occur within forty-eight hours after treatment is stopped, and that in cases in which no signs of discharge had been present for a number of days and in which no gonococci could be obtained from cultures taken from the urethra nor from the centrifuged urine, and I have come to doubt very much if abortion of gonorrhreal urethritis can be obtained except in an occasional case. In looking over the records of my private cases, I find that the shortest time in which the specific microorganisms disappeared, not to return, was two weeks, and this obtained only in a single case. When judiciously applied, there can be no doubt that irrigations cause disappearance of the symptoms and, in many cases, shortening of the infection. Recently, however, I have been keeping a record of the cases treated with injections of permanganate and find that, on the whole, exactly as good results can be obtained as with irrigations. An occasional writer still refers to the use of strong injections of nitrate of silver for aborting the disease, but this method has justly become discredited owing to the complications which are apt to follow its employment.

The time to abort any specific urethral infection is immediately after the germs have been deposited upon the urethral mucosa, and, if we can judge from evidence thus far accumulated, such a desideratum is possible of attainment in a considerable majority of all cases in which prophylactic instillations of protargol or other organic silver salts are used immediately after intercourse. Why such a howl should be raised in certain quarters when this method of prevention is advocated surpasses the

bounds of understanding. This method, and the use of a protective covering, are the only things from which much is to be expected in lessening the morbidity of venereal diseases. If prophylactic instillations could be used in civil life to the same extent that they are in the Army and Navy, then we should find that a great reduction in the frequency of disease would follow. I cannot but urge general practitioners to advise their patients, whenever occasion arises, of the value of this method and also of the value of inunctions of calomel ointment as a preventive of syphilis. By so doing they will accomplish more good than they would by the distribution of a thousand tracts issued by certain theorists, whose utterances show that they know nothing of the subjects which they endeavor to discuss.

**Urethral Pain following Urethritis.** It is not unusual for patients who have had an attack of urethritis, particularly if it has become chronic, to complain of localized pain in the urethra, of variable degree, after every trace of their inflammation has disappeared. Very little has been said about these urethralgias in the text-books and oftentimes they have been interpreted as subjective phenomena altogether independent of any structural changes in the urethra or its adnexa. The subject has been given considerable attention by E. Jeanbrau,<sup>1</sup> of Montpelier, who reported his observations, extending over a period of six years, at the last meeting of the French Urological Association. Of 58 patients who were studied, 35 were evidently cured of their gonorrhea, having no discharge whatsoever nor any lesions in the urethra which could be detected by examination with sounds or with the urethroscope. Their prostates seemed perfectly normal. A few epithelial filaments in the urine were the only signs remaining of their preceding inflammation, the other 23 patients had one or more localized patches of infiltration, and from time to time would notice a slight discharge containing certain bacteria, but no gonococci. The symptoms experienced by all these patients were much alike. Some compared the sensation to that of a burn or a scald, others stated that it was like the prick of a needle, and others that it was exactly like the pain experienced in the early stages of a boil. As to location, it was present just behind the glans, in the fossa navicularis, or in the deep urethra. It was continuous, and lasted from three to six hours, after which it ceased spontaneously. In nine patients, the pain came on every day at about the same time. With the exception of those cases in which the pain can be explained by chronic urethroprostatitis or beginning tabes, the author believes that it is either of a neuralgic character or else due to compression of nerves by the products of periglandular or perilacunar inflammation, or that it may be dependent upon an inflammation of these nerve filaments themselves which end in the corpus spongiosum. It is interesting to note that the same opinion has been expressed by Finocchiaro, who

<sup>1</sup> Procès Verbaux de l'Ass. Fran. d'Urologie, 1912.

published an article on the subject some three or four years ago. The treatment consists in the use of high dilatation, urethral massage, irrigations, and electricity. The results are somewhat uncertain and benefit is oftentimes not experienced for a number of months. It is important not to overtreat with such active measures, and for this reason the author advises that intervals of repose be given to the patient and then the treatment begun again.

**Congenital Stricture of the Posterior Urethra.** Authentic cases of this malformation are very rare, and Heinecke,<sup>1</sup> of Brunswick, who reported a case, was able to collect only nineteen others in the literature. His own case was that of a child, aged five years, who had had trouble in urinating since birth. The little patient was suffering from an infection of the bladder resulting from a previous attempt at catheterization. Successful catheterization without an anesthetic resulted in the evacuation of a large quantity of purulent urine. Catheterization was repeated every day for a while, though with difficulty, so that, in view of the increasing infection, suprapubic cystotomy was decided upon. Despite the operation, the child died. The autopsy showed a congenital stenosis of the membranous urethra, which was due to overdevelopment of the semilunar folds normally present in that portion of the canal.

**Catheterization of the Ejaculatory Ducts.** Improvements in the technique of urethroscopy has made it possible to treat the lesions of the posterior urethra and its adnexa with greater satisfaction than they were formerly treated. In a recent paper, Luys<sup>2</sup> discusses the indications for catheterizing the ejaculatory ducts. He considers the method especially useful in cases of chronic inflammation in which the seminal vesicles cannot be satisfactorily emptied by massage, and also in cases of painful ejaculation, which are for the most part due to narrowing of the lumen of the ducts. He also considers the method indicated in cases of hemorrhagic discharge from the seminal vesicles, which he believes to be due either to chronic inflammation of the vesicles themselves or to changes in the ducts. The technique is considered easy. The orifices of the duct are brought into view by means of the urethroscope, and a small metal sound is passed through the instrument and introduced into the orifice of the duct. Luys mentions the case of a man affected with chronic inflammation of one seminal vesicle who was not benefited by prostatic massage, which failed to secure a satisfactory evacuation of the contents of the vesicle, and which also on several occasions gave rise to some orchitis. The ejaculatory duct corresponding to the diseased vesicle was catheterized, after which the vesicle could be completely emptied. The patient's urine, which had been purulent for a long time, cleared up very quickly and remained normal. In conclusion, Luys states that catheterization of the

<sup>1</sup> Zeitschrift für Urologie, 1913, Band vii, Heft 1.

<sup>2</sup> La Clinique, February 14, 1913.

ejaculatory ducts constitutes one of the greatest advances of modern urethroscopy.

**Reconstruction of the Urethra.** In previous reviews the substitution of veins, segments of the urethra, and various plastic procedures have been considered. Last winter A. Miller,<sup>1</sup> of Constantinople, reported five cases in which Thiersch's method had been used with success. After a wide resection of the stricture, he reformed the anterior wall of the urethra by means of a cutaneous flap taken from the thigh. At the end of a week this flap is grown in place so that the posterior wall can be reconstructed by means of sutures passed through the edges of the wound and including the skin of the penis or of the scrotum. A large Nélaton catheter is passed into the urethra and the sutures placed while it is *in situ*.

**Primary Carcinoma of the Fossa Navicularis.** Primary carcinoma of the urethra was formerly considered exceptionally rare, and it is only within the last ten years that many contributions to the subject have appeared in literature. About five years ago Preiswerk collected and analyzed forty-two such cases affecting the male urethra. If his results be compared with those of Karika, who investigated the disease in the female, it will be found that the two sexes are affected with about equal frequency. In men, the cavernous and membranous parts of the urethra seem to be the sites most frequently invaded by the new growth. In view of the statement made by Wolfe in his recent paper, that the fossa navicularis has never been the site of such a neoplasm, the case recently reported by Benno Ottow,<sup>2</sup> of Dorpat, is to be considered unique. It was that of a man, aged sixty-nine years, who gave a history of having had a number of attacks of gonorrhea in early life, and who had also had, about forty years previous, an attack of chancreoid. He complained of a swelling along the course of the urethra at the level of the frenum, which was of two weeks' duration and which was then followed by a purulent discharge from the meatus. Amputation of the penis was practised, and, upon examination, it was found that the fossa navicularis, from the external meatus to the cavernous part of the urethra, was occupied by a neoplastic growth, which the microscope showed to be a squamous-cell epithelioma, evidently originating from the fossa. At the end of six months, the patient had shown no signs of recurrence.

**Erosive and Gangrenous Balanitis.** This contagious sexual disease, not incorrectly denominated "the fourth venereal disease," was first described a number of years ago by Bataille and Berdal, although it received a more thorough study by Müller and Scherber, who gave the results of their observations based upon an analysis of one hundred and fifty cases. Their paper was followed by contributions from Romeo, Dind, McDonagh, and a number of other writers. Within the last

<sup>1</sup> Deut. med. Woch., December 5, 1912, No. 49.

<sup>2</sup> Zeitschrift für Urologie, 1913, Band vii, Heft 1.

year, two papers have been published on the subject, one by Tieche,<sup>1</sup> of Zurich, and one by Corbus,<sup>2</sup> of Chicago. The latter writer had already reported his observations on the subject as long ago as 1909, having written a paper in conjunction with Dr. F. G. Harris.

The cause of this disease is a symbiosis of a vibrioform bacillus and a spirochete, both of which are anaërobic. Both stain readily with Giemsa's solution. The vibrioform was Gram-positive. The spirochete was Gram-negative.

As exciting causes, wetting of the genitalia with saliva, unnatural coitus, and tightness of the prepuce resulting in the exclusion of air have been mentioned. Corbus states that in this country the disease is uncommon in private practice, but that in dispensary patients it is quite frequently met with. Tieche states that it is not uncommon in Zurich, especially the erosive form. He has seen six cases of the erosive type and one of the gangrenous.

The beginning of the disease is characterized by the appearance of numerous papules on the glans and the inner layer of the prepuce, the majority of which are covered with a whitish secretion much like a pseudomembrane. They increase in size, and, after the coating has been cast off, present the appearance of irregular red erosions, the edges, however, still being covered with the whitish coating. In cases of mild degree, the prepuce may be partly drawn back. The secretion is abundant, and a moderate degree of pain is present. The appearance of the lesions in this form of the disease is so characteristic that there should be no difficulty in making a diagnosis if the existence of this infection be borne in mind. When the inflammation increases, however, that is, when the lesions involve the deeper tissues, an indurated edema of the foreskin takes place which leads to complete phimosis. The erosions become converted into oval ulcers, the dorsal lymphatics of the penis become swollen, the associated lymph nodes become enlarged, and, in fact, the condition much resembles a luetic infection in which a simultaneous or secondary infection with the organs of suppuration has taken place. Occasionally, the inflammatory process may advance to the stage of gangrene, which may destroy the glans or perforate the prepuce and involve the more superficial and even the deep structures of the penis. Hemorrhages resulting from invasion of the corpora cavernosa have been known to take place. Such destructive lesions terminate, as a rule, by a line of demarcation of gangrenous and healthy tissue with the casting off of the necrotic portion, the end-result often being a very much deformed penis. In the severe forms, constitutional disturbance is always present. Scherber and Müller found that fever was present in the majority of cases they studied.

With reference to diagnosis, it seems not improbable that the most

<sup>1</sup> Correspondenz-Blatt für Schweizer Aerzte, December, 1912.

<sup>2</sup> Journal of the American Medical Association, June 7, 1913.

common error would be to mistake the patches of this disease for beginning chancreoids. The presence of a vibrioform bacillus and spirochete in the discharge would, of course, prove its nature irrespective of the clinical appearance of the lesions. Likewise, early involvement of the inguinal lymph nodes in chancreoid, their painfulness and early suppuration would be points of value in a differential diagnosis. Corbus states that chancreoids do not spread with such rapidity as do the ulcers of this form of balanitis. The condition of the lymph nodes in erosive balanitis is similar to that which obtains in early syphilis, and consequently there is danger in confounding the two conditions. Naturally, the finding of the *Spirocheta pallida* or the vibrioform bacillus associated with another variety of spirochete would prevent confusion of the two diseases, and, in this connection, I would take occasion to impress upon the general practitioner the importance of having a microscopic examination made of the secretion from all genital sores. Furthermore, in severer cases which do not heal spontaneously, the Wassermann examination would be of the greatest value. Tieche reports a case of the gangrenous form of this disease which he was inclined to consider as being luetic, but in which, after several weeks of observation, during which time repeated blood examinations had shown a negative Wassermann reaction, the true nature of the disease became apparent. Despite the finding of a fusiform bacillus and a large spirochete in the secretion, the clinical manifestations were so suggestive of syphilis that Tieche was inclined to consider the trouble as such until the course of time proved to the contrary. In cases in which mixed infection has taken place, naturally not so much value is to be placed upon failure to find the *Spirocheta pallida*, for the reason that not infrequently these parasites become destroyed when associated with the organisms of suppuration.

The *treatment* is very simple in cases of the erosive type. All that is necessary to do is to bring the causative microorganisms into contact with air and they will die. If the foreskin can be retracted, a thorough cleansing of the parts with a weak solution of hydrogen peroxide will suffice. In the ulcerative types, with phimosis, a dorsal incision can be performed and the same solution, or, perhaps better, a stronger one applied. In severe cases of the gangrenous type, Corbus recommends 25 per cent. solution of hydrogen peroxide. Corbus warns against the practice of cauterizing such ulcers. The prophylactic measures, of course, would consist of the more general adoption of the operation of circumcision, as in the absence of the foreskin it would be very difficult for the causative microorganism to find a favorable soil for growth. The papers of Corbus and Tieche are very interesting and are commended to all those who desire further details on the subject.

**Plastic Induration and Sclerosis of the Corpora Cavernosa.** In addition to such indurations of the penis as are associated with chronic inflam-

mation, a form known as plastic induration has come to be recognized, although its pathology is still somewhat obscure. Formerly it was supposed to affect only middle-aged or old men, and was thought to be due to a systemic condition, such as diabetes or gout. Recently a number of cases have been reported in young men. Le Fur,<sup>1</sup> of Paris, reported three such cases at the last meeting of the French Urological Association. The ages of his patients were twenty-eight, thirty-five, and forty years respectively. In addition to the causes usually recognized, they call attention to the effect which tuberculosis may have in producing the lesions. One of the cases was attributed to this disease. He believes that any traumatism inflicted upon the part which results in rupture of the small alveoli of the cavernous tissue, produces a condition favorable for the localization of tubercle bacilli if there be any circulating in the blood. The lesion thus produced tends to spontaneous cure, and the sclerosis is thought to be a relic of the previous plastic infiltrate. The fibrous nodule always effects the sheath of the corpus cavernosum, especially the sheath between the two bodies, usually being located in the anterior third, although it may be found anywhere as far down as the scrotum. In some cases, the nodule has been found to consist of pure fibrous tissue. In others, islands of embryonic tissue have been found scattered through the mass. The symptoms associated with the abnormality are characteristic, consisting of a deviation of the penis during erection. The pain is sometimes very severe, and there is a more or less pronounced condition of neurasthenia. The latter, of course, may be dependent upon the symptoms due to the pathological changes themselves. As to *treatment*, the author recommends tuberculin in all cases in which tuberculosis is suspected as an etiological factor. Electrolysis gave good results in two cases. When no improvement follows such therapeutic measures, extirpation of the fibrous nodules should be undertaken. In the discussion which followed, Desnos stated that he had used the *x*-rays in three such cases and that some benefit resulted in all. Improvement was noticed after a few treatments, but further application of the rays failed to produce a complete cure.

Three cases have also been reported during the year by Verth and Scheele,<sup>2</sup> of Berlin.

#### TESTICLES, CORD, AND SEMINAL VESICLES.

**Malignant Tumors of the Testicle.** In a work published some time ago, Arnaldo Vecchi presented an exhaustive article on teratoma and mixed tumors of the testicle, adding a number of new cases to those which

<sup>1</sup> Proces Verbaux de l'Ass. Fran. d'Urologie, 1912.

<sup>2</sup> Deutsch. f. Chir., February, 1913.

had already been reported. In a more recent work,<sup>1</sup> he has studied the simple tumors affecting this organ, having collected thirty-one new cases. He first studies the most common forms, which have been described by different authors, as carcinoma, sarcoma, endothelioma, but which he, in common with de Bernardi, prefers to group under the title of large-cell tumors of the testicle. After a brief description of their clinical characteristics and gross morbid anatomy, the author proceeds to a description of their histological structure, particularly the relation of the tumor cells to the stroma. These were studied by the most delicate methods. Then the relations between the tissue of the tumor and the tissue of the testicle are discussed, and the method by which the neoplasm grows. With reference to the latter, he has shown that its growth is expansive and infiltrating, and that, in the larger and older tumors, the neoplastic infiltration takes place in the intertubular connective tissue, while in smaller and younger ones it may be intratubular. With reference to the histogenesis of these large-cell tumors, the author believes that they are derived from atypical proliferation of the germinal epithelium, embryonal or adult. Consequently they should be considered as epitheliomas presenting special characteristics because of their mesodermic origin. He reports two cases of sarcoma, one of which was bilateral. One of these cases was of the small round-cell variety, and the second was of the mixed-cell variety. There was one case of adenocarcinoma, which the author believed to have originated from the genital portion of the Wolffian body.

Another communication of interest in this respect is one which was made by Bayer,<sup>2</sup> who states that an exact differentiation between sarcomas originating from the tunica vaginalis of the testicle and those developing from elements of the spermatic cord is not always to be made. He reports two cases occurring in the clinic in Bonn, in which it was demonstrated that the tumors had originated in the cord.

An interesting case has been reported by Mr. Seton Pringle,<sup>3</sup> of Dublin, in which a malignant tumor of the testicle was removed, together with the inguinal lymph nodes, seminal vesicles, psoas fascia, and retroperitoneal lymph nodes. The last named were followed up as high as the juxta aortic group. All the structures were taken away in one piece, and the author states that the technical difficulties of the operation were not great. The patient was free from recurrence at the end of eight months.

**The Surgical Treatment of Lymphatic Varix.** Degorce,<sup>4</sup> of Hong Kong, reports three operations for lymphatic varices, and states that the indi-

<sup>1</sup> Zeitschr. für Urologie, October, November, and December, 1912.

<sup>2</sup> Beitr. zur klin. Chir., December, 1912.

<sup>3</sup> London Lancet, January 4, 1913.

<sup>4</sup> Bull. Soc. Med. Chi. l'Indo-Chine, January 1, 1913.

cations for this operation are very narrow, inasmuch as it is not good surgery to remove a portion of the tumor and leave the greater part behind, and as the involvement of the lymphatic system in these cases oftentimes extends to the lumbar aortic lymph nodes or even as high up as the thorax, there are few cases amenable to a radical operation. The desideratum most greatly to be desired would naturally be the removal of the cause. The author states, however, that up to the present time the most that has been attempted has been the removal of a few centimeters of the accessible enlarged lymph vessels. The results of such dissection were not brilliant in three cases which he reports. After the operation, the scrotum remained swollen, edematous, and sensitive to pressure despite the fact that the incisions all healed by first intention. Two of the three patients had a double varicocele, and the author operated on one side only so that he might later compare the condition of one with the other. Neither of the two patients returned for operation upon the other side. The author remarks that those who have written upon the subject are remarkably silent concerning the remote results of the operation. In one of his cases, the lymphatics of the testicle became enlarged a few days after the operation. In another, there was an abundant chyluria, and he found changes in the general health of the patient after the operation. In view of these unsatisfactory results, the author proposes to limit operation to those cases of lymphatic varicocele which are large in size and painful.

The technique of the operation is very simple, the inguinal canal being opened and the diseased lymphatics dissected from the upper pole of the testicle to the internal abdominal ring. In cases in which separation of the artery is very difficult, the author expresses the belief that it is better to ligate it and remove it with the lymphatics, trusting to the artery of the vas to preserve the nutrition of the testicle. The same thing applies to the veins. A testicle badly diseased should be removed, although the author states that a portion of it may be left for the effect it may have upon the morale of the patient. So, too, if there be an associated lymph scrotum, a partial resection should be practised. The author advises against drainage.

**A Case of Cyst of the Tunica Vaginalis.** A case of this rare affection was recently reported by Cantas,<sup>1</sup> of Athens. It occurred in a young man, aged sixteen years, who presented a swelling as large as one's fist extending from the right side of the scrotum into the inguinal region. It was first noticed at a very early age, and had gradually increased in size as the patient had grown older. A diagnosis of congenital hernia with hydrocele was made, and at the operation a hernial sac communicating with the cavity of the tunica vaginalis was found. What had seemed to be a hydrocele, however, proved to be two cysts, one the size of a pigeon's egg and the other as large as a cherry,

<sup>1</sup> Journal de Chir., Belge, October 7, 1912.

which were attached to the parietal layer of the tunica vaginalis by means of pedicles. They were situated about three centimeters below the orifice between the hernial sac and the cavity of the tunica. The hernia was treated in the usual way, and the cysts were resected, together with a portion of the parietal layer of the tunica vaginalis. The patient left the hospital in ten days completely cured. The fluid contained within the cysts had all the physical and chemical characteristics of hydrocele fluid. Their walls were identical in structure with the parietal layer of the tunica, being composed of two layers, one of connective tissue and the other of epithelium. That portion of the tunica to which the cysts were attached, as well as the pedicles themselves, were found to be the site of an active inflammation characterized by an infiltration of polynuclear leukocytes and some lymphocytes, as well as by the presence of newly formed capillary vessels engorged with blood. The author believes that the inflammation was the cause of the cyst formation. Under the influence of the latter, he believes that a sort of fold was formed in the tunica, the edges of which were finally brought together so as to form a small parietal serous cyst, which developed gradually until the time of the operation. Such an explanation seems very reasonable, and is in accord with the histological structure of the cyst walls and the nature of their contents.

**Seminal Vesiculotomy** The name of Dr. Eugene Fuller is closely associated with the operation of seminal vesiculotomy, he having made several communications upon the subject within the last few years. In a recent paper,<sup>1</sup> he reviewed the indications for the procedure and discussed the results obtained in two hundred and fifty-four cases. The operation consists essentially of drainage of the seminal vesicles after they have been opened through a prrectal incision, and, judging from the cases discussed by the author, it is very valuable in a certain class of affections. The author states that the operation is not easy, and advises that it be undertaken only by surgeons of experience. The principal indications for its performance are acute lesions of the genital organs of gonorrhreal origin, in which the vesicles and tissues contiguous to them and the prostate have become the seat of the suppuration, and cases of gonorrhreal arthritis. It may be remembered that the author is enthusiastic in his recommendation of the operation for the latter condition, inasmuch as he is convinced that foci from which the toxins are absorbed are frequently located in the vesicles. In the suppurative cases, rapid and complete cure is the rule after drainage has been established. The joint cases are both important and interesting. In the acute cases, it is stated that the toxemia subsides rapidly after the vesicles have been opened. In the chronic cases, the results are not so striking. Two or three months after the operation it may be advisable to begin massage of the vesicles, and also to employ passive motion of

<sup>1</sup> Journal of the American Medical Association, November 30, 1912.

the affected joints. It is interesting to note that, in his earlier experience, Fuller frequently had recrudescences in the joint cases a month or six weeks after operation. These were attributed to too early closure of the wound, so he now keeps it open longer, leaving the drain in place for ten days and allowing the wound to heal only from the bottom. Since his first article was published in 1909, he has operated upon eighty-nine patients affected with arthritis. All were benefited by the operation, 8 per cent. being cured in a month or six weeks. It was impossible to follow all the other patients after they left the hospital. Fuller has also performed this operation in cases in which nervous and even mental symptoms relating to the sexual organs predominate, and likewise in a few cases of sexual debility. He remarks that the number of such cases was few, for the reason that patients do not readily consent to having an operation of such magnitude performed, and also because neurologists refuse to send such patients to the surgeon for operation. I cannot but feel that the neurologists show very good judgment in taking this stand, and I certainly should hesitate myself to perform the operation of vesiculotomy in the absence of well-marked objective symptoms calling for it.

Voelcker,<sup>1</sup> of Heidelberg, has reported eleven cases of operation upon seminal vesicles. There were no fatalities in this series of cases, nor were there any important operative or postoperative complications. Two of the patients were operated for tuberculosis; two for neoplasms; three for compression of the ureters; three for arthritis, and in one the vesicles were removed, together with an hypertrophied prostate in a case of infection associated with epididymitis. The author expresses the opinion that much can be said in favor of this operation in cases of gonorrhreal arthritis. He also believes that concealed foci in the vesicles may be responsible for infection of the bladder and kidneys. The three cases of compression of the ureter are interesting. One was the case of a man, aged twenty, who was suffering from gonorrhreal cystitis. In the fourth month of his disease he began to complain of severe pain in the region of the right kidney and developed in pyelitis. The seminal vesicle on the right side was found to be much thickened, and there was considerable exudate around it. At operation no abscess was found, but the ureter was compressed by the inflammatory exudate which had become organized. The thickened tissues were divided and the renal symptoms disappeared. Another similar case was one of prostatic hypertrophy in which the prostate, together with the vesicles, was removed, the latter being embedded in thick, scar-like masses of exudate. In this case, too, the attacks of renal colic subsided. In another case of chronic prostatitis and spermato cystitis, associated with an ascending cystopyelitis and stone in the kidney, very little benefit resulted from nephrectomy and seminal vesiculotomy.

<sup>1</sup> *Folia Urologica*, June, 1913.

This operation impresses me as being one to which more attention should be given. As stated above, I believe that it should be performed only when well-defined conditions demand it. It certainly is too serious to be done as an experiment.

### MISCELLANEOUS.

**Pseudo-epidural Injections in the Treatment of Essential Enuresis in Children.** The epidural injections of salt solution, introduced by Cathelin a number of years ago, have been employed with varying success in the treatment of essential enuresis. In this country, the method has never been generally adopted, although a few surgeons who have used it have reported favorable results. In 1909 Professor Allaria, of Turin, published an interesting paper concerning it, embodying numerous statistics collected for the most part from the reports of those who had used it just after it had been proposed by Cathelin. Included in his report were the favorable results obtained by Goetzel, Concetti, and a number of others. His own experience did not compare very favorably with the results obtained from other methods, particularly the institution of a hygienic and dietetic regimen and the administration of tonics and antispasmodics. A careful examination of the cases in which he obtained the best results led him to conclude that the benefit might have been due in large part to psychic influence, that is, to suggestion. It was especially in the cases of older children that this factor seemed to be operative. Consequently he was induced to try the effect of "a pseudo-injection,"<sup>1</sup> as he terms it, which consisted in giving a hypodermic injection along the course of the spine. He has recently published the results obtained by this method. Twenty-three children were thus treated, all of whom were affected with essential enuresis. During the time in which they were under treatment the children were allowed to live at home, merely reporting at the Dispensary for the injections. No other treatment whatsoever was given. The injections were made once a week. In some of the cases true epidural injections were given alternately with the hypodermic injections in order to determine whether any different effect would be produced. Of the 23 patients, there were 12 in whom no result whatever was obtained; 6 experienced transitory benefit, 5 were relieved of their symptoms for a long period of time and 1 considered as cured. Thus it is seen that the results may be stated to have been fairly good, especially if the rebellious nature of essential enuresis be considered. The author states that they were certainly not inferior to those shown by many reports upon true epidural injections, his own being included. In 10 cases in which the pseudo-injections proved to be without effect,

<sup>1</sup> *La Pediatria*, 1912.

16 true epidural injections were given; the latter had scarcely any effect at all, the only difference being a slight increase in the number of micturitions in one case, and the control of the enuresis for one night in another. The author very justly states that these results do not give a lesser degree of efficacy for the epidural injections, inasmuch as the latter were employed only in cases in which the pseudo-injections had proved futile. It is interesting to note that the best results were obtained in cases of children who were most afraid of the injections and who resisted the most. Among the patients who were not benefited, there was one who was much below the normal in intelligence; one who did not complain of any pain when the needle was introduced, and one, a girl of twelve, who always laughed while the injections were being given. In conclusion, the author expresses his opinion that the most potent factor in bringing about a cure is the psychic one, whether the injection be true epidural or only hypodermic. He does not believe that it can be attributed to any specific action of the salt solution upon the spinal nerve roots or the spinal centres in cases in which the former method has been employed. If one remembers that suggestion in many forms was employed years ago in the treatment of essential enuresis, his contention seems not at all improbable. Fear and hypnotism are well known to have given good results in some cases; the same may be said of electricity, the action of which may have been purely suggestive.

**Spinal Analgesia in Genito-urinary Surgery.** This method was made the subject of a discussion by Nicholich,<sup>1</sup> of Trieste, at the last meeting of the French Urological Association. He has used the method in 409 cases, of which 148 were operations upon the kidney, 83 upon the bladder, 42 upon the prostate, 12 upon the perineum, and 124 upon the external genital organs. In the operations upon the kidneys, satisfactory results were obtained almost without exception, even in the most difficult cases. Some patients complained, however, during the delivery of the upper pole of the organ. In operations upon the bladder, and in prostatectomies, the results were also very favorable. For removing tumors of the bladder the method was found excellent, even better than chloroform anesthesia, so far as permitting a complete examination of the interior of the viscus was concerned, the reflexes seeming to be better abolished. Three centigrams of stovain were found to be sufficient for cases of lithotomy, whereas four were required in prostatectomies. Two or three centigrams gave perfect analgesia of sufficiently long duration in the majority of the operations performed through the perineum and upon the external genital organs. Headache was a sequel of considerable frequency, although since larger quantities of spinal fluid have been removed it has become very rare. Vomiting during or after the operation was exceptional. In 5 cases, analgesia

<sup>1</sup> Proces Verbaux de l'Ass. Française d'Urologie, 1912.

failed to be produced, and in 18 it was insufficient, the operation having been completed under chloroform. The serious accidents were as follows: Complete paralysis of the bladder, which lasted for two weeks, was observed in a case of a very weak patient in whom a cystolithotomy had been performed. Three patients, aged seventy-six, eighty, and eighty-seven years, were affected with syncope, which was relieved by pressure over the cardiac region and injections of caffeine. Respiratory paralysis lasting several minutes took place in the case of a tuberculous patient. Artificial respiration brought on normal breathing. Ocular paralysis occurred in a patient, aged fifty-two years, who had been operated upon for a tumor of the bladder. The strabismus appeared fifteen days after the operation and lasted for three weeks. Right hemiplegia and aphasia occurred in the case of a woman, aged forty-three years, who had been operated upon for a stone in the kidney. The accident occurred the fifth day after the operation. The patient made a complete recovery, she was seen several months after she left the hospital and presented no signs of trouble. The author concludes his article with the statement that spinal analgesia with stovain is to be preferred in genito-urinary surgery either to chloroform or ether, because it is less dangerous, both as regards its immediate and late effects, and because it renders operation upon the kidneys less dangerous and those upon the bladder more easy. My own belief concerning this matter is that it should be employed only in exceptional cases, where there is contra-indication either to the use of ether or chloroform. Ether, properly administered, is a very safe anesthetic.

**Vaccines in Gonorrhreal Arthritis.** Farkas,<sup>1</sup> of Budapest, reports the results obtained in thirty cases from the use of gonococcic vaccine. In the majority of cases the temperature rose sharply after the injection, but the fever was not associated with any headache or with any disturbances of the general health. In the cases which were benefited, a local reaction always occurred within twenty-four hours after the injection. This consisted in an increased swelling of the affected joint, redness of the skin, and accentuation of pain. This condition, however, was superseded by a retrogression of all the symptoms. In cases treated at their inception, complete cure was obtained in from eight to ten days. In chronic cases, improvement was much slower, cure being delayed for a considerable time. In such cases, too, the reaction to the injection was very slight or even entirely wanting. The vaccine used was the proprietary preparation known as "Arthigon," which the author considers a very satisfactory one. He gives as much as 2 or 3 c.c. at a dose, and in one case gave 5 c.c. He states that the reaction following the injection of this vaccine constitutes a trustworthy diagnostic sign, as, in arthritides of non-gonococcic origin, febrile disturbance and increase in the severity of the local manifestations do not occur.

<sup>1</sup> Pester Med. Chir. Presse, November 19, 1912.

**Uremic Ulceration of the Vaginal Mucosa.** The following case reported by Eichorst<sup>1</sup> is a unique one. A woman, aged fifty-seven years, who had been somewhat indisposed for a number of weeks, was suddenly seized with nausea, vomiting, diarrhea, pain in the abdomen, and a partial suppression of urine. These symptoms were soon followed by violent headache and some mental confusion. She was admitted to the hospital with a diagnosis of nephritis and uremia. The total quantity of urine for twenty-four hours was about 800 cubic centimeters. It was turbid, had a specific gravity of 1.01, and contained 0.6 to 1000 of albumin. Her uterus was somewhat enlarged and painful to touch. There was also an abundant dark colored vaginal discharge, which was treated with douches of Lusoform. It was thought that the nephritis might be due to a compression of the ureters by cancer of the uterus, and the vaginal discharge was thought to be due to the same cause. The patient became progressively worse, and died on the fourth day after she was admitted. Autopsy showed lesions of the right temporal and frontal lobes, arteriosclerosis of the basilar and coronary arteries, subpericardiac ecchymoses, parenchymatous nephritis, and ulcerations of the vagina. The latter were situated on the anterior and posterior walls and were circumscribed, some being covered with fibrin, others with granulations. In shape they were round, and measured about 3 c.m. in diameter. The uterus was not diseased except for a small myoma in its posterior wall. The bladder and ureters were normal. The ulcerations were considered analogous to those produced upon the intestinal mucosa by uremia.

**The Treatment of Bartholinitis.** The glands of Bartholin have long been recognized as the last refuge of the gonococcus. The destruction of these foci of infection has been undertaken by the injection of various chemicals by the galvanic current and by incision and curettage. Among the chemicals most frequently used for this purpose may be mentioned strong solutions of nitrate of silver, a saturated solution of phenol in alcohol, and potassium permanganate in concentrated solution. In a recent communication upon the subject, Faivre<sup>2</sup> reports successful treatment with a solution of chloride of zinc, one to twenty. The reaction was painful for the first twenty-four hours, but after that time the patient experienced no discomfort. A considerable destruction of tissue took place, so that a dressing was required for a number of days, but healing took place and no signs of disease could be elicited afterward.

**Adamon for Sexual Excitement.** This drug is a combination of bromine and borneol, insoluble in water, soluble in ether and in chloroform, insipid in taste, non-odorous and non-irritant. It is prescribed

<sup>1</sup> *Riforma Medica*, November 23, 1912.

<sup>2</sup> *Rev. Prat. des Mal. Org. Gen. Urin.*, March, 1913.

in doses of three grams in powder or capsule. E. R. W. Frank,<sup>1</sup> of Berlin, has found it useful in quieting excitement of the sexual organs, particularly in controlling the erections of acute gonorrhea. Three grams given in divided doses an hour before bedtime is the usual quantity employed, although as much as six grains may be used. The author states that the effects of this preparation were truly remarkable in every case in which he used it.

**The Effect of Bile Salts on the Gonococcus.** Von Hoffmann,<sup>2</sup> of Vienna, has recently reported the results which he obtained in the treatment of gonorrhea with bile salts. He used human bile as well as that of cattle and swine, the results obtained from all three being practically the same. One series of cases was treated with urethral injections, 1 or 2 per cent. in strength, which were retained five or six minutes. There was a diminution in the discharge, and a lessening of the number of gonococci, but cure was not obtained. Solutions in the strength of 5 to 10 per cent. produced more decided results in both respects, in some cases the discharge disappearing completely after a few days' treatment. It came back, however, when the injections were stopped. In another series of cases the treatment was combined with the use of silver, but, because of the difficulty experienced in obtaining a solution of silver and other heavy metals with the bile salts, these were abandoned. In his third series of cases, the author treated patients with injections of bile salts and silver solution, the two being used alternately. The patients thus treated did exceedingly well, the duration of their disease being very much shortened.

<sup>1</sup> *Deutsch. med. Woch.*, December, 5 1912.

<sup>2</sup> *Wien. klin. Woch.*, 1912, No. 444.



# SURGERY OF THE EXTREMITIES, SHOCK, ANESTHESIA, INFECTIONS, FRACTURES AND DISLOCATIONS, AND TUMORS.

By JOSEPH C. BLOODGOOD, M.D.

In the December numbers of PROGRESSIVE MEDICINE since 1899, in this article on surgery, we have discussed certain general problems, such as injuries, infections, and tumors. Under the subject Injuries we have the great question of shock—the general effect of a trauma, whether accidental or operative. The problem of anesthesia belongs here. The local effect of an injury is a wound. The question of prevention of infection in accidental wounds is by no means as settled as in operative wounds. There are still many interesting problems in the healing of wounds, especially of open wounds, whether infected or not. Local infections still call for much attention. The number of infections and infected wounds in private and hospital practice today is so small as compared with the number in preantiseptic times and in the early years of antiseptic surgery, that the scanty experience of physicians and surgeons does not give them the opportunity or incentive to learn what their predecessors knew, or to keep abreast with recent experimental and clinical investigations. For this reason, as a matter of fact, today the treatment of infections and infected wounds is not what it should be.

In the treatment of infections, when they become general, we have made little progress. The important thing is to recognize the local infection or infected wound in its early stage and by appropriate treatment prevent general infection.

In regard to tumors, the great interest today is in the recognition and complete removal of the precancerous lesion, or of the tumor in the very earliest stage of malignancy.

Experimental research on the causation of tumors has as yet led to no practical conclusions. Improvement in our results in the treatment of benign and malignant tumors still rests on clinical and pathological investigation.

We have also discussed here lesions of special tissues, such as muscles, bones, joints, tendons, bursæ, nerves, skin, subcutaneous tissue, and bloodvessels. In all of these tissues we have lesions the results of injury, infection, or neoplasms.

## INJURIES.

**Shock**, a term now employed to describe the general condition of the patient due to some factor or factors all of which can be included under the term "traumatic."

These traumatic factors apparently chiefly affect the nerve cells of the brain and spinal cord. As we have discussed in previous numbers, Crile is of the opinion that he has been able to demonstrate, both in man and animals, changes in these nerve cells which can be recognized by the microscope. He is of the opinion that these histological changes of varying degrees represent different degrees of destruction of the cell protoplasms and nucleus. In some cases, there may be complete recovery; in others, partial; while in still others the nerve cell is destroyed beyond recovery. This investigation has not been confirmed as yet, but clinical evidence seems to support this view. There is no doubt as to the condition of shock. Apparently we know many, if not all, of the factors. We are beginning to learn that shock can be prevented, or at least recognized sufficiently early to indicate a treatment which will lead to recovery in the majority of cases. In every patient, whether surgical or medical, we must bear in mind the general condition in relation to the local disease. If our field of vision does not go beyond the local lesion, the results of our special diagnosis and treatment will by no means be as favorable as when we constantly keep in mind the general condition.

The chief factors of shock are PSYCHIC, TRAUMATIC, TOXIC, and HEMORRHAGIC. It may be difficult to define *psychic* shock, or the mental phenomena which affect the patient, yet we are quite certain, from clinical observation, that the condition of shock may follow psychic disturbances without any definite trauma, toxin, or loss of blood. These psychic phenomena are described as fear and anxiety. The causes of fear and anxiety are numerous. The effect varies with the condition of the patient. The fear of impending operation and of the local disease is often a factor that must be considered. Both physicians and surgeons have a definite function and duty to perform in alleviating fear and anxiety. This has been aptly called moral anesthesia. It is an art which every doctor of medicine should acquire. In the teaching of medical students, this problem of psychic shock and its treatment by "moral anesthesia" is neglected.

For years surgeons have been familiar with *traumatic* shock in accidental injuries, but, for some reason difficult to explain, they have ignored this possible factor during the operation. They have felt that when the patient is anesthetized with chloroform or ether and remains quiet during the operation, the manipulations of the operator on the unconscious patient which would be painful if the patient were awake, do not produce shock. Yet they have observed again and again

extreme, and even fatal, shock after an operation in which there had been no loss of blood and during which the patient had taken the anesthetic quietly. For years nothing was attempted to prevent this traumatic shock from operative manipulations. Even after the introduction of local anesthesia, surgeons attributed their better results and the absence of shock to the exclusion of the general anesthetic, and gave no credit to the blocking of painful impulses from the wound by the local anesthesia. Crile was one of the first to get this idea clearly, and this led him to the development of his present technique of anocianesthesia, which is a combination of local and general anesthesia. Undoubtedly, other surgeons had this in mind, but they never developed it to the same perfection.

When it was my good fortune to come to Baltimore, in 1892, and become associated with Dr. Halsted at the Johns Hopkins, I found that he had definite ideas in regard to shock, different from most surgeons in this country and abroad. Many operations were done under local anesthesia, dissections were done with a sharp knife, and not bluntly; tissues were handled with the greatest care; operations were done bloodlessly; bleeding points, and not masses of tissues, were clamped and tied. Dr. Halsted then emphasized most that such handling of tissues led to the better healing of the wound. He may have had in mind, but did not lay special stress on, the importance of such gentler manipulation of tissues in the reduction of shock. At that time so many surgeons operated rapidly, with little regard to loss of blood, that the most obvious factor of shock was hemorrhage. Dr. Halsted absolutely eliminated the factor of hemorrhage in shock, wherever possible, and the difference became manifest to any observer.

This traumatic factor in operations must be now recognized by every surgeon.

The *toxic* factor of shock may be of long duration, due to the local disease. This is especially true in all infections of bacterial origin, and of toxins due to certain diseases. This toxic factor in shock is most prominently observed in goitres with thyreotoxic symptoms; in acute and chronic intestinal obstruction; in jaundice; in certain stages of diabetes, especially in the presence of diacetic acid and acetone in the urine; in chronic alcoholism. The longer the duration of the bacterial or non-bacterial toxins, the greater the degree of shock. It is for this reason that early intervention gives better results. Crile would explain it by the statement that the longer the duration of the infection, the greater the changes in the nerve cells.

The toxic factor of shock also becomes active when we use toxic drugs for local or general anesthesia. It required, however, many years before surgeons realized that the danger of chloroform was due to its toxic effects, both immediate and late. Ether is distinctly less toxic than chloroform. Undoubtedly, the advantage that nitrous oxide

and oxygen has over ether as an anesthetic is due to its non-toxic properties. If we judge of general anesthesia by the behavior of the patient, chloroform would become the anesthetic of choice. It is easier to administer, the patient is more quiet and relaxed. Nitrous oxide and oxygen is the most difficult of all general anesthetics to administer, but experience shows that it is safer, and this safety is most clearly demonstrable in handicapped patients and in major operations. Cocaine is more toxic than novocain. As far as relieving pain during the local anesthesia, cocaine has no superior, but, even with weak Schleich's solutions, toxic after-effects have been observed, and this explains why cocaine has been superceded by novocain. In the employment of all drugs before, during, and after operations their toxic effect, especially in relation to shock, must be borne in mind. Scopolamin must be used with great caution. The dose of morphine and atropine must be guarded. Eserine, which has become popular in the treatment of postoperative distention and gas pains, is a dangerous drug and should not be used as a routine.

The *hemorrhagic* factor of shock has long been known, and now all surgeons agree on the necessity of bloodless operations. But we must also recollect that the hemorrhagic factor of shock is prominent when there has been loss of blood before the operation. This complication can now be successfully checked by direct transfusion of blood. We must also remember that anemia may have the same effect as direct loss of blood. For this reason, a careful blood count should be made before operation. Patients with anemia of any type are much more susceptible to all the other factors of shock, and if the surgeon does not know this before operation, he cannot guard against it.

Crile<sup>1</sup> is of the opinion that the so-called aseptic wound fever and sometimes postoperative hyperthyroidism are simply symptoms of shock, and that they can be prevented by employing his technique which he calls anoci-technique. He attempts to reduce psychic shock by moral anesthesia and scopolamin before operation; during operation, all painful impulses from the wound are blocked by local anesthesia with one to four hundred novocain solution; the patient is rendered unconscious by the least toxic anesthetic—nitrous oxide and oxygen; and the after pain in the wound is relieved by local injections of quinine and urea into the region of the wound before it is closed. Many surgeons are still skeptical as to the importance of Crile's anoci-technique. My personal experience confirms his conclusions.

**TREATMENT OF SHOCK.** *Salt Solution.* Curtis and Davis,<sup>2</sup> of Chicago, at the suggestion of Dr. Dean Lewis, investigated experimentally the treatment of acute anemia from hemorrhage by direct blood transfusion and by intravenous saline infusion. They came to the conclusion that in grave anemia the intravenous infusion of salt

<sup>1</sup> Annals of Surgery, May, 1913, vol. lvii, p. 648.

<sup>2</sup> Surgery, Gynecology, and Obstetrics, 1912, vol. xv, p. 476.

solution has but a temporary effect and is helpful for but a few hours; that blood transfusion is the treatment of choice. They also feel that the use of fresh, defibrinated blood is not to be recommended for acute anemia. My clinical experience agrees with the results of this experimental work. In these cases, while one is preparing for a direct transfusion, the intravenous salt infusion can be started at once.

Sippel<sup>1</sup> calls attention to the danger of using distilled water only for intravenous infusion, and recommends that the solution be always sterilized by boiling. I am confident that, at least in this country, everyone employs solutions so sterilized. He is also of the opinion that infusions of large quantities of physiological salt solution are dangerous when there is nephritis or impaired kidney function. Isotonic grape-sugar solutions are less dangerous.

Today one should know the condition of the kidneys before operation and always guard against too large quantities of salt solution.

Schouste<sup>2</sup> recommends the space of Retzius for subcutaneous salt infusion. In his experience, this has no dangers, and gives less discomforts than the ordinary position beneath the breast and into the axilla. My experience, however, with the latter is so large and so satisfactory that I see no reason for changing the position, except in cases in which the chest cannot be used. I am impressed that Retzius' space would be better than the thigh.

*Blood Transfusion.* A number of interesting papers were presented before the Surgical Section of the American Medical Association this past June. Bernheim,<sup>3</sup> of Baltimore, who has done so much excellent experimental work on vessel suture, gives a very good and clear presentation of the therapeutic possibilities of transfusion. He is of the opinion that every surgeon should familiarize himself, by animal experiments, with the technique. Kimpton and Brown,<sup>4</sup> of Boston, report a new and simple method of transfusion. I must refer to the original for the details.

The literature is filled with new methods of technique—too many for review. Landon,<sup>5</sup> of Philadelphia, also reports a new method with self-retaining tubes. My own experience has been with Crile's cannula or Bernheim's modification, and I have met with no difficulties.

*Adrenalin.* As I have discussed before, the dangers of this drug for intravenous administration are greater than its advantages.

*Strophanthin.* I find no new report from surgeons on the employment of this drug as a heart stimulant. My personal experience with it, however, has increased very much, and I always employ it when the blood pressure is lower than 90, and when no results follow change in position and the employment of salt solution.

<sup>1</sup> Centralbl. f. Chir., 1912, p. 849.

<sup>2</sup> Ibid., p. 905.

<sup>3</sup> Journal of American Medical Association, 1913, vol. Ixi, p. 268.

<sup>4</sup> Ibid., p. 117.

<sup>5</sup> Ibid., p. 490.

*Heart Massage.* Pieri<sup>1</sup> summarizes 76 cases of massage of the heart in syncope. In 58 cases, the syncope was associated with chloroform narcosis, in only 3 cases with ether; in the remaining 7 cases, the syncope occurred in patients not under anesthesia. This agrees with my previous statement that we rarely see this complication, except in chloroform anesthesia. For this reason, it can be prevented in the vast majority of operations, as chloroform is rarely necessary. Pieri finds that when the syncope takes place early in the chloroform anesthesia, the results of the massage are not as good as in the late syncope. There were 19 recoveries, 16 temporary recoveries, and 41 failures. The majority of recoveries took place when the heart was massaged through a laparotomy wound, and not among those cases in which the heart was directly attacked through an incision in the diaphragm or chest.

The results, as Wrede<sup>2</sup> also says, are successful in a sufficient number of cases to justify its employment. There should be no delay. The brain rarely recovers after an anemia lasting longer than fifteen minutes. In conjunction with heart massage, there should always be artificial respiration. It is my opinion that the chapter on the direct massage of the heart will be rewritten when our experience with intratracheal anesthesia makes us proficient in direct intratracheal artificial respiration. This method will allow not only respiration, but direct attack of the heart through a costal incision. I trust that these complications in anesthesia will become of merely historical interest, but the indications for heart massage in syncope are present in other conditions—death from electric shock, asphyxia, severe trauma to the heart, and sudden syncope in various diseases.

**PREOPERATIVE TREATMENT AND DIAGNOSIS.** *Anemia.* Byford<sup>3</sup> considers anemia as an operative risk. He divides anemias into two classes: anemias with compensation. Here the hemoglobin may be below 50 per cent., the red cells are usually above 4,000,000. These anemias are of long standing, there is no emaciation; the blood-pressure is good. He is of the opinion that these patients stand operations well if there is no loss of blood. In anemias without compensation, the patients have lost weight, have a low blood-pressure and a rapid pulse. These patients do not stand operations well.

Cullen,<sup>4</sup> reports on 170 cases observed in the Gynecological Department of the Johns Hopkins Hospital between the years of 1899 and 1912, in which the hemoglobin was 40 per cent. or below. The causes of anemia were uterine myomas, bleeding from hyperplasia of the endometrium, cancer of the cervix, pelvic infections, retained placenta, tubal pregnancy, adenomyoma of the uterus, chorioepithelioma. One

<sup>1</sup> Centralbl. f. Chir., 1913, p. 1045.

<sup>2</sup> Archiv f. klin. Chir., 1913, Band ci, S. 833.

<sup>3</sup> Surgery, Gynecology, and Obstetrics, 1913, vol. xvii, Abstract, p. 65.

<sup>4</sup> Ibid., p. 66.

hundred and fifty-two cases recovered from the operation. On the whole, Cullen is of the opinion that these patients stand anesthesia and operation fairly well, but he believes that, in some cases, blood transfusion before, during, or after operation will reduce the mortality.

Esch,<sup>1</sup> from his experience, recommends, in cases of marked anemia, the preoperative treatment with intramuscular injections of defibrinated human blood.

It has been my experience that if the anemia does not increase there should always be a preliminary preoperative treatment. But when hemorrhage is taking place nothing is gained by delay, or if the cause of the anemia other than hemorrhage is still active and cannot be combated by non-operative methods, there should be no delay in operative help. When the anemia is grave, blood transfusion should first be performed, to be followed immediately by operation.

DIABETES. H. Kaposi<sup>2</sup> gives a collective review on this subject, with 128 references to the literature. Benedict, Szigethy, and others<sup>3</sup> discuss the relation of diabetes to surgical intervention. But I find in these articles nothing that I<sup>4</sup> have not previously brought out.

In brief, all authorities seem to agree that diabetes itself is not a contra-indication to the ordinary operation, especially when all the factors of shock are considered and the anesthesia is good. We must also recollect that some surgical lesions may be the cause of the glycosuria, such as infections like carbuncle. All infections are bad for diabetic patients. For this reason there should be no delay in the treatment, and the treatment of the local infection should be more radical than in the non-diabetic patient. In many cases, after the radical removal of the carbuncle, or of the local infection, the sugar and even the diacetic acid and acetone may disappear from the urine very quickly. In cases of gangrene with diabetes, in which it seems justifiable to delay before selecting the position of the amputation, the appearance of acetone and diacetic acid in the urine should be looked upon as an immediate indication for operation. Therefore, when the lesion can be considered as the cause of the diabetes, or when it is a factor aggravating it, operation should be immediate without preliminary treatment; but if the surgical trouble of itself is not urgent and is apparently not aggravating the general disease, the diabetic condition should first be treated. If, under proper diet, the sugar is eliminated or decreased, the patients may be looked upon as good risks. But, if it is not affected by diet, and acetone and diacetic acid are present, such patients are bad risks and should not be subjected to operation unless, as stated before, the lesion is aggravating the diabetic condition.

<sup>1</sup> Centralbl. f. Chir., 1912, p. 229.

<sup>2</sup> Ergebnisse der Chir. u. Orthop., 1913, Band iv; Centralbl. f. Chir., 1913, p. 1110.

<sup>3</sup> Centralbl f. Chir., 1912, p. 463.

<sup>4</sup> PROGRESSIVE MEDICINE, December, 1901, p. 188; 1908, p. 165.

No diabetic patients should be subjected to the usual starvation treatment before and after operation. All patients with sugar in the urine should receive bicarbonate of soda in large doses in salt solution per rectum. On the first and slightest sign of threatening coma, bicarbonate of soda should be given intravenously.

This entire subject of preoperative treatment and diagnosis was thoroughly considered last year.

*Preventive Surgery.* This term was used for the first time in PROGRESSIVE MEDICINE in my last contribution. A. D. Whiting,<sup>1</sup> of Philadelphia, discusses this under the title "Conservatism in Surgery," and subdivides the problem into eight headings.

1. Inability to estimate the individual's recuperating power. For this reason the earlier the intervention, the less will be the demand on this recuperating power.

2. Lack of careful study of the case. This hardly needs discussion today.

3. Failure to recognize the curative power of nature. This really means unnecessary interference, when the treatment should be non-interference.

4. Failure to weigh the contra-indications. In operations which can be delayed, small lesions may be sufficient to contra-indicate an operation of that kind until the condition can be more carefully studied, or until it can be treated. For example, cold, bronchitis, albumin in the urine, a trace of sugar, enlarged tonsils, adenoids, etc. Often patients are sent to the hospital in good condition and on the morning of the operation may develop a cold, or the preoperative investigation may find some general condition not noted before.

5. Failure to recognize the seriousness of every operation.

6. Desire to do more than necessary.

7. Desire to enter new fields.

8. Failure to put the interest of the patient first.

This excellent paper shows the growing tendency of modern surgery which is to give careful consideration to the general condition of the patient as well as to the local condition, and to act accordingly.

*POSTOPERATIVE COMPLICATIONS. Mortality.* Death from operation is, of course, the most serious complication, and the factors in the cause of death are numerous. There are two recent contributions on this subject by Petrén,<sup>2</sup> from the surgical clinic of Borelius, in Lund; and Beckman,<sup>3</sup> from the Mayos' clinic, in Rochester. Petrén investigates the causes of postoperative death during a period of about ten years (1900 to 1910) in his own and one other clinic. The average mortality is about 3.3 per cent.

<sup>1</sup> Journal of American Medical Association, 1913, vol. lx, p. 423.

<sup>2</sup> Beiträg. z. klin. Chir., 1912, Band lxxix, S. 83.

<sup>3</sup> Annals of Surgery, 1913, vol. lvii, p. 718.

The most interesting feature, however, is Petrén's group of cases from his own clinic. In the first group, he includes all acute abdominal diseases due to infection. There are 841 operations, with 68 deaths, or 8.1 per cent. The great mortality in this group is due not so much to complications from the operation as to the disease itself which was not cured by the operation, that is, late intervention. In this group, of course, he includes acute appendicitis, acute cholecystitis, pelvic infections, etc. In the second group are operations for infections outside of the abdomen—1285 cases, with 56 deaths, a mortality of 4.4 per cent. It is natural to expect a lower mortality here, because infections outside of the abdominal cavity are less fatal. But the investigation of the mortality in this group, too, demonstrates that the chief cause of death is the disease subjected to operation in too late a stage. In the third group are included all acute surgical lesions not due to infection, such as strangulated hernia, intestinal obstruction, cerebral hemorrhage, extra-uterine pregnancy, etc.—759 cases, 46 deaths—a mortality of 6.1 per cent. Here also the cause of death in most cases is due to late intervention. In the fourth group are included all operations for malignant tumors—692 cases, 68 deaths—a mortality of 9.8 per cent. Even in this group the chief cause of death is the advanced malignant disease. In the fifth group he includes all chronic diseases of a non-malignant character—4863 cases, 66 deaths—a mortality of 1.3 per cent.

The contrast here is at once evident. Here the disease was not associated with autoinfection or toxemia, or malignant change, and the mortality is distinctly less, even when intervention was relatively late.

These figures show that, to improve our mortality, surgical intervention must be instituted as soon as possible, especially in acute diseases and for malignant tumors.

The next cause of death in this clinic is lung complications, such as pulmonary embolism and pneumonia. The author, however, does not study it in relation to his method of anesthesia. I would place faulty anesthesia as second only to the disease itself in the causation of post-operative death.

Death due to faulty technique apparently is but a small factor, for example, infection of the wound, hemorrhage during or after operation, peritonitis from faulty suture after resection of the hollow viscera, etc. This cause is absolutely under the control of the surgeon.

Death due to the presence of general diseases which lower the vitality of the patient is also a relatively small factor. This can be eliminated to a certain extent by more careful preoperative study and treatment.

Beckman,<sup>1</sup> in his article entitled "Complications following Surgical Operations," also gives the mortality following operations in the Mayo

<sup>1</sup> Loc. cit.

clinic at Rochester. The number of patients is 5835, operated on during the year 1912. He gives a table of the types of operation with the total number of cases, the total number of operations, and the total deaths. This tabulation will give a very good idea of the average risk after operations performed under the very best environment, by the most skilled surgeons, under ether anesthesia. There is no discussion of details, but we can tell at a glance the dangerous operations, either due to the condition of the patient or the magnitude of the operation. For example, there are 363 ligations of the thyroid vessels, with 5 deaths. Here we have an operation which should have no mortality when performed upon a healthy individual. These deaths simply indicate the extreme state of toxemia of some of the patients. The mortality of thyroidectomy in exophthalmic goitre is only one death in 275 cases. As an example of increased mortality due to the gravity of the operation, that is, an operation difficult to perform without shock, there were 4 deaths among 27 posterior resections of the rectum for cancer, and 6 deaths among 41 resections of the colon including the rectosigmoid colon for cancer. Now, as a rule, the patient with stone in the common duct is in a worse general condition than the one with cancer of the colon. Yet this operation is one which can be performed with less shock, but we observe 5 deaths among 96 operations for stone in the common duct. The difference between the mortality of cholecystectomy and of cholecystostomy is illustrated in their figures: after cholecystectomy, 5 deaths in 255 operations; after cholecystostomy, 3 deaths in 426 cases.

These figures could be used again and again to illustrate the factors in mortality—the condition of the patient and the toxic shock of the operation.

Beckman also gives a list of all the complications following the different types of operations. I am impressed with the fact that their cases of thrombophlebitis and lobar pneumonia are relatively few—12 cases of each, all after laparotomy. Fourteen infections of the wound after 315 operations for inguinal hernia seems to me too high.

*Psychoses.* This subject is commented on by Mumford<sup>1</sup> and by Schultze.<sup>2</sup> The latter is of the opinion that the number of true post-operative psychoses is small. In most cases, the mental disturbance is due to the pre-existing disease which has either not been relieved soon enough by the operation, or not completely. The chief causes of these mental disturbances are infection, toxemia, and inanition. We are all familiar with the mental disturbances of typhoid and other fevers, with the toxemias of jaundice, Graves' disease and colon obstruction, starvation due to pyloric obstruction, of cirrhosis of the liver, impaired

<sup>1</sup> Publications from the Massachusetts General Hospital, October, 1911, vol. iii, p. 536.

<sup>2</sup> Deutsch. Zeitschr. f. Chir., 1910, vol. civ, p. 584.

kidney function, diabetes. Now, it is often the case that the mental symptoms are not especially prominent before operation, but every operation throws a more or less greater burden upon the individual, and in these cases, in which the factors of safety are relatively small, the equilibrium is disturbed by the operative procedure. A man with cirrhosis of the liver due to alcohol in apparently fair mental condition may be tremendously upset by operative intervention for a hernia. From my own personal experience, therefore, we must be careful in subjecting patients with such conditions to operation unless the operation is distinctly indicated to relieve the infection, the toxemia, or their cause. Very nervous and hysterical patients with a low grade of psychic disturbance may be tremendously upset by any operative intervention unless it relieves them of a burdening condition. This is frequently seen in exophthalmic goitre in which the symptoms are slight. When such patients are subjected to operation other than intervention on the thyroid, and for conditions which do not aggravate the thyreotoxic symptoms, they are tremendously disturbed. The whole question, therefore, of postoperative psychoses may be considered under the general subject shock—early intervention, intervention only when indicated, intervention properly performed under skilful and selected anesthesia and with the least amount of wound trauma, intervention so carefully planned and successfully carried out that the local condition is completely relieved with the least psychic, traumatic, or toxic shock—all of these are problems in shock.

I also find an article by Howard A. Kelly.<sup>1</sup> He follows the classification of Regis and divides his cases into three groups:

1. Those coming on immediately after operation and due to anesthesia and shock.
2. Those coming on a little later, due to septicemia, shock, and auto-intoxication.
3. Those coming on still later, due to asthenia from prolonged illness.

In all cases it is more frequently observed in patients especially predisposed to mental instability. Kelly also gives 19 references to the literature.

*Peripheral Paralysis.* These occur in the upper and lower extremity and are absolutely preventable complications. They are caused by faulty position of the extremity or faulty employment of the Esmarch bandage. Rosenstein<sup>2</sup> discusses the former, and Lauenstein<sup>3</sup> the latter.

We can always place the arms in the proper position, and when the leg must be fixed in a flexed and abducted position at the hip-joint for pelvic or rectal work, this can always be done in such a way that the danger of paralysis is eliminated. These position-paralyses have occurred. Every member of the operating-room staff should bear it

<sup>1</sup> Surgery, Gynecology, and Obstetrics, 1909, vol. ix, p. 515.

<sup>2</sup> Centralbl. f. Chir., 1911, p. 163.

<sup>3</sup> Ibid, 1912, p. 709.

in mind and use the proper means to prevent their occurrence. I have observed no paralyses in my clinic for at least seven years. Rosenstein states that in his clinic it occurred in 0.4 per cent. of the anesthesias. When one employs the wide Martin rubber band, the danger of paralysis from the Esmarch is practically eliminated.

*Wound and Scar Pain.* Leigh Watson,<sup>1</sup> of Oklahoma City, discusses Crile's method of infiltrating the tissues with a solution of quinine-and-urea form one to two inches from the margin of the wound in order to relieve postoperative pain, as local anesthesia with these drugs lasts longer than that with novocain.

My experience with this is not yet large enough to indicate whether it is really necessary in laparotomy wounds. I am confident, however, that it is useful in rectal work, especially after operations for hemorrhoids, fissures, and fistulas. Whether the operation is done under general or local anesthesia, postoperative pain is very frequent. This can be practically eliminated by quinine-and-urea infiltration.

*Pneumonia.* In my own experience, postoperative pneumonia is due to bad ether anesthesia, late intervention in acute abdominal lesions, late intervention in patients whose general condition is impaired by starvation (pyloric stenosis), jaundice—that is, operations upon patients in whom the local disease had lowered the resistance, or in whom the general resistance is impaired by many factors.

Any operative manipulation which increases shock also lowers the patient's resistance, and this complication—pneumonia—is more frequent. Exposure to cold, especially in seasons when changes in the temperature take place suddenly, and the heating plant does not keep pace with the change in the temperature, is also responsible for a number of cases of postoperative pneumonia.

Postoperative pneumonia has practically disappeared from my own clinic, since the routine employment of nitrous oxide-and-oxygen, and local anesthesia, the more careful preoperative treatment and the consideration of every detail in the prevention and treatment of shock. In addition to these, the number of late interventions is growing smaller, but apparently even in these very ill patients we are preventing pneumonia by the new anesthetic and operative technique.

This must be true, because since 1908 I find only one reference in the surgical literature to postoperative pneumonia. Previous to that date there were a number of communications.

*Pulmonary Embolism.* Since Trendelenburg's<sup>2</sup> first report on the operative treatment of pulmonary embolism, a great deal has appeared in the literature. Wilson,<sup>3</sup> of the Rochester clinic, reports all the fatal

<sup>1</sup> Annals of Surgery, 1913, vol. lvii, p. 730.

<sup>2</sup> Archiv f. klin. Chir., 1908, vol. lxxxvi, p. 686; PROGRESSIVE MEDICINE, December, 1908, p. 158.

<sup>3</sup> Annals of Surgery, 1912, vol. lvi, p. 809.

cases of postoperative embolism which have been observed in St. Mary's Hospital since the opening in September, 1889. It is interesting to note that during the first ten years, among 6000 major operations, no deaths recognized to be due to embolism occurred, while in the next twelve years, among 57,000 major operations, there were 47 fatalities, or 1 in every 1213 operations. Wilson explains this as follows: During the first ten years of the Mayo clinic the number of operations on the stomach, gall-bladder, lower colon, prostate, and uterus was relatively small as compared with the number of such operations in the last twelve years. Second, the general condition of the patients in the first ten years was relatively better, because they came from the locality of the clinic and were operated on in the earlier stages of the disease, while during the last twelve years the number of referred cases from a distance and in the later stages of the disease, where operation was a last resort, has increased. The factors, therefore, seem to be major operations, late intervention on patients whose general resistance is lowered, and, perhaps, the presence of a low grade of infection increasing the coagulability of the blood.

Wilson then groups 40,449 operations with 47 deaths from embolism—0.12 per cent. He has apparently, therefore, excluded 17,000 operations for conditions in which this complication has not taken place. This complication has followed certain operations with the following per cent. of deaths:

It is most frequent after operations on the prostatic gland, 601 operations with 4 deaths, 0.66 per cent. Next in frequency are operations on the small intestine—389 operations, 1 death, 0.26 per cent.; colon and rectum, 2530 operations, 5 deaths, 0.20 per cent.; gall-bladder, 4597 operations, 9 deaths, 0.19 per cent.; bloodvessels, 1372 operations, 2 deaths, 0.14 per cent.; stomach and duodenum, 2391 operations, 3 deaths, 0.12 per cent.; among 4501 operations for hernia there were 5 deaths, and among 900 operations on the kidney, 1 death, 0.11 per cent. In the other groups, the per cent. is less than the average; 3266 operations on the thyroid, 2 deaths, 0.06 per cent.; 2281 operations on the mouth, 1 death, 0.05 per cent. The per cent. is least after operations on the appendix, 9908 operations, 4 deaths, 0.04 per cent.

The age of the patients varied from twenty-five to seventy-two years of age; 41 of the 47 patients had been ill from two to thirty-five years with a chronic debilitating disease, and the majority of them were probably the subjects of a low-grade bacteremia. The symptoms of embolism took place in 40 cases within the first two weeks; the remaining 7 cases were scattered between the twenty-first and sixtieth-fourth day. In general, these 47 patients after operation were apparently convalescing well until the symptoms of the fatal embolism took place. The embolism, in 36 instances, was pulmonary; in 10, cerebral; in one, coronary. In 28 cases, the original thrombus was

found in a vein in the field of operation or in the femoral vein; in 4, the emboli developed apparently in the heart; in the remaining cases the site was not determined. The chief cause, therefore, of post-operative embolism is thrombosis of veins in the field of operation or in the femoral vein.

As preventive measures, Wilson offers the following: Reduce vascular traumatism to a minimum and allow for free drainage whenever indicated; encourage very early free movements on part of the patient (this does not necessarily mean getting the patient out of bed). In some cases, the preoperative administration of drugs to increase the coagulability of the blood may be contra-indicated, but the data on this are not sufficient. Wilson does not critically study the 9 deaths among 4597 operations on the gall-bladder as to this point. Everything should be done to reduce bacteraemia.

Schumacher,<sup>1</sup> from the Zurich clinic, discusses the operative treatment of pulmonary embolism and its early diagnosis. He, however, was not successful in his 3 cases. In the discussion of his paper by Laewen, from Trendelenburg's clinic, we find that, in this clinic where the operation originated, there have been further operations without success.

Schumacher also contributes an early clinical sign. After the first stormy symptoms suggesting pulmonary embolism, and before the heart is exhausted in its endeavor to overcome the obstruction, there is heard on auscultation a new sound at the base of the heart which disappears as the heart gets weaker. Schumacher thinks that perhaps the disappearance of this sound may be looked upon as an indication for operation.

*Thrombophlebitis of the Lower Extremity.* It is very interesting to note that, in the cases of fatal postoperative embolism, previous symptoms or signs of thrombophlebitis of the lower extremity have been rarely present. Apparently, if the thrombosis is in the femoral or iliac vein, the embolism, if it is to follow, does so at once, before pain or swelling are observed in the limb. When the signs of thrombophlebitis of the lower extremity are well established, the danger of embolism has passed.

This complication, according to Burnham,<sup>2</sup> takes place in 0.81 per cent. among 11,655 operations investigated. It is, therefore, more frequent than fatal embolism, which, according to Wilson's statistics, is 0.12 per cent. The frequency of thrombophlebitis in relation to the character of the operation is about the same as fatal embolism, but it is difficult to compare Wilson's tables with Burnham's because in the latter there are no statistics in regard to operations on the prostate, stomach, colon, and gall-bladder. Burnham's material comes from the Presbyterian Hospital in New York, and covers a period from 1905

<sup>1</sup> Centralbl. f. Chir., 1913, Supl., S. 54; Archiv f. klin. Chir., 1913, Band ei, S. 818.

<sup>2</sup> Annals of Surgery, 1913, vol. Ivii, p. 151.

to 1912. The relative frequency of this complication varies from 4.1 per cent. after hysterectomy to 0.23 per cent. after miscellaneous operations the character of which is not stated. In my study of this complication following operations for inguinal hernia, it occurred in 0.7 per cent. Burnham found it in 0.9 per cent. It is more frequent after laparotomy than any other operation. From the reports of five large clinics, this complication varied from 1 per cent. to 3.6 per cent. after laparotomy, while in a large obstetrical clinic it occurred in only 0.12 per cent.

Burnham concludes that postoperative thrombophlebitis is an infectious disease, that it is preceded by slowing of the blood current, and associated with some local and general disease of the vessel wall. It occurs earlier after operation in closed, clean wounds than in drainage cases. Rest in bed, with elevation of the extremity, is the best therapeutic measure. Ichthyl ointment seems to alleviate local pain.

Kuhn,<sup>1</sup> after a most elaborate experimental investigation and study of the few clinical observations, comes to the conclusion that *grape-sugar* given intravenously may be helpful *in preventing, or in the treatment of, thrombosis*. He finds that grape-sugar has an anticoagulation action; it is nutritious and slightly antitoxic; it can be given subcutaneously, intravenously, by mouth or per rectum. The proper solution for intravenous or subcutaneous solution is as follows:

Dextrose	4.00
Sodium saccharate	0.04
Calcium saccharate	0.04
Sodium chlorate	0.85
Distilled water	100.00

This, therefore, is a 4 per cent. solution of sugar in salt solution, 40 grams to the liter. As the maximum dose is one gram per one kilogram of weight, this 40 grams in one liter of salt solution is well within the maximum dose for the adult. When given intravenously the sugar remains in the blood only a short time, and therefore its action is but temporary and the dose must be repeated, perhaps every three to six hours. In some clinical cases it has been given intravenously up to three liters of a 9 per cent. solution for six days.

As we cannot prognosticate this complication, it might be a good plan to employ Kuhn's sugar solution per rectum as a routine after operation.

In cases in which the danger of this complication is greatest, we might give an intravenous infusion from day to day for a few days.

In my own experience with thrombophlebitis, I have found that intestinal distention is as a rule present in all the cases for some days before the symptoms of thrombosis develop and that these cases have had frequent and large soap-and-water enemas. Since I have given up

<sup>1</sup> Deutsch. Zeitschr. f. Chir., 1913, Band cxxii, S. 90

soap-and-water enemas this complication has decreased tremendously. Last summer, during my vacation of two months, the administration of soap-and-water enemas was resumed as a routine at St. Agnes' Hospital with the immediate reappearance (six cases) of thrombophlebitis, while in the previous year among a greater number of operations there had been but one case.

I am so convinced that the toxemia of intestinal paresis with its distention is a prominent etiological factor, that now in all laparotomy cases I plan to reduce this to a minimum. In the preoperative treatment of non-acute cases, no cathartic is given nearer than forty-eight hours to the day of the operation. The diet in most cases is restricted to water and egg-albumen. After operation, the patient is given immediately salt solution per rectum. In four to six hours the patient is given a water-and-glycerin enema of one ounce of glycerin to three ounces of water. This alternating salt-solution by Murphy's drop method and water-and-glycerin enemas are given continuously every four to six hours for a number of days, according to indications. After the third day, in most cases, olive oil is substituted for water, and the water-and-glycerin enemas are given only twice a day. The salt solution is discontinued as soon as the patient can take sufficient water by mouth, and the amount of urine passed in twenty-four hours is more than 1000 c.c.

In all operative cases, especially laparotomies, we attempt, by pre- and postoperative diet, and by this rectal therapeutic measure, to encourage the movement of gas and feces along the colon and their ejection per rectum, preventing or reducing the toxemia of paresis and distention. When this has been successful, I have never observed a thrombophlebitis, and I believe my observations to have been accurate. This treatment is continued so long as the patients are in the hospital, whether they get up early or not, and, if they leave the hospital before the third week, they are instructed to take an enema of oil and glycerin, or a glycerin suppository morning and evening, when the bowels do not move freely. Cathartics are rarely employed, except when the stomach is washed out for dilatation, when castor oil is left in the stomach. My experience teaches me that the increased peristalsis due to cathartics is less efficacious than enemas, and in going over the cases of thrombophlebitis we find that, in addition to the large soap-and-water enemas, these patients have received numerous cathartics. We must, therefore, not wait for intestinal distention to begin treatment, and we must not employ strong and irritant cathartics, nor large and distending rectal enemas.

*Fat Embolism.* Benestad<sup>1</sup> reports 3 cases of fat embolism which were observed after fractures of long bones in healthy men. The symptoms came on a few days after the injury; First, dyspnea and coughing,

<sup>1</sup> Deutsch. Zeitschr. f. Chir., 1912, Band exii, S. 194.

then cerebral symptoms, numbness, interference with memory, nausea, fever, pain in the body and extremities; then, on the third day, pinpoint hemorrhages in the skin over various parts of the body which disappeared in about four days. The three patients recovered.

Groendahl<sup>1</sup> gives the most complete clinical and pathological study from the University of Christiania. He is of the opinion that Wilms' treatment may prove to be a life-saving measure in some cases.

Wilms<sup>2</sup> advocates the drainage of the thoracic duct in the neck on the first symptoms of fat embolism. This is based upon animal experiments and one clinical case.

Gaugele and Risel<sup>3</sup> report on fat embolism after orthopedic operations, and also agree to the possibilities of Wilms' procedure.

I have had no personal experience with this complication.

*Acute Dilatation of the Stomach.* In the Mayo clinic, this complication has been practically eliminated by the postoperative employment of the stomach tube on the first appearance of symptoms. This has been my own experience. After operations upon the stomach, and after resection of the colon, I now employ gastric lavage as a routine within six or eight hours. If duodenal contents are found in the lavage, it is repeated in eight hours. After a negative lavage, it is not repeated unless there are symptoms. The symptoms of dilatation of the stomach are epigastric distress, distention, rapid pulse, hiccough. One should not wait for vomiting. Vomiting alone does not necessarily mean dilatation of the stomach. When we employ nitrous oxide-and-oxygen as an anesthetic, vomiting is rarely observed, except when due to dilatation of the stomach. After ether or chloroform, however, it is more frequent without dilatation of the stomach, and is then due to the toxic action of the drug.

*Post-anesthetic Vomiting.* If we can believe Bickle,<sup>4</sup> the administration by mouth of 1 gram (15 grains) of chloretone one and one-half hours before operation will prevent postanesthetic vomiting, and all the other discomforts and complications of anesthesia. It is quite clear to me that it could not relieve vomiting due to dilatation of the stomach, and it is hard to believe that another toxic substance would relieve the vomiting due to the toxic action of ether and chloroform.

Ferguson,<sup>5</sup> from his clinical and experimental investigation, is of the opinion that olive oil promises nothing in the relief of postanesthetic vomiting, but liquid petrolatum might. It seems to me, however, that the accumulated experience of surgeons shows that we must not depend upon drugs to prevent postanesthetic vomiting. This depends upon

<sup>1</sup> Deutsch. Zeitschr. f. Chir., 1911, Band cxi, S. 56.

<sup>2</sup> Centralbl. f. Chir., 1910, Supl. S. 8.

<sup>3</sup> Zeitschr. f. orthop. Chir., 1911, Band xxvii, S. 279.

<sup>4</sup> Therapeutic Gazette, 1912, p. 181; Centralbl. f. Chir., 1912, S. 848.

<sup>5</sup> Journal of American Medical Association, 1912, vol. lix, p. 146.

bad preoperative treatment, the traumatic shock of the operation, and the toxic action of ether, chloroform and even morphine in some cases, or to dilatation of the stomach. We can prevent this complication, or reduce it to a minimum, by eliminating or reducing the factors of shock, by proper postoperative treatment with the early employment of gastric lavage, the routine rectal administration of fluid to increase elimination, and the non-employment of many drugs by mouth, which have been recommended by individuals with limited experience in surgery. Of course, some cases of postoperative dilatation of the stomach are due to technical blunders in gastric surgery in which the new anastomosis between the stomach and the small intestine is faulty. This is a problem in abdominal surgery not to be discussed here.

*Postoperative Intestinal Paresis.* I have just discussed my own method of treatment. Pettenkofer<sup>1</sup> recommends electric enemas for extreme cases of intestinal paresis not due to mechanical obstruction. Fig. 26 shows the tube. It is introduced above the highest opening in

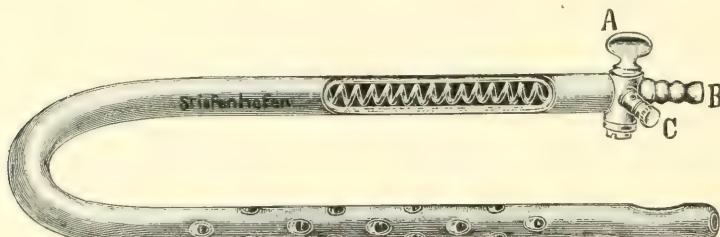


FIG. 26

the side. At *B* the tube of the irrigating vessel is attached. The salt solution (from 500 c.c. to 1 liter) is allowed to run in slowly without emptying the vessel. In this way we have in the lower bowel a column of fluid. One electrode is then applied to *C*, and the other electrode over the abdomen. The current, faradic or combined, is turned on slowly and permitted to increase to 50 milliampères and then slowly decreased. This is repeated two or three times for about fifteen minutes. The patients usually experience the colicky pains of peristalsis, and bubbles of gas and feces-stained fluid pass into the irrigating vessels. Sometimes the tube itself is forced out. Preliminary to this enema, Pettenkofer sometimes gives one-half a milligram of physostigmine every half hour, beginning two hours before the enema.

His experience, although apparently limited, seems to have been quite satisfactory.

*Hormonal.* As a therapeutic agent to increase peristalsis and to be employed for chronic constipation and for postoperative intestinal paresis, this new drug receives considerable attention in recent literature.

<sup>1</sup> Beiträg. z. klin. Chir., 1913, Band lxxxiii, S. 615.

Henle<sup>1</sup> was the first to call attention to its practical employment. The drug is now obtained from the spleen, which seems to be the storing organ. It can also be obtained from the mucous membrane of the stomach and duodenum, but from this source it is more difficult to get it sterile. The earlier preparations seemed to have some extraneous albumose, and in animal experiments and clinical observations there seemed to be a difference of opinion as to the results. It failed in some cases, while in a few others there was collapse, with fall of the blood pressure. From experimental investigation there is no doubt that hormonal is a better stimulant for peristaltic action than physostigmine or eserine. It is simply a question of whether it is a dangerous drug, because many of these patients are ill, and their blood-pressures are low. The two most recent articles<sup>2</sup> deal with the new hormonal, which seems to have been freed of the extraneous albumose. From their animal experiments and clinical investigations they are of the opinion that it affects the blood-pressure little, if at all, and if given slowly, intravenously, there is no danger of collapse, and the action of increasing peristalsis can be relied upon. It is given just as salvarsan is intravenously. Each vial contains the adult dose of 20 c.c., which should require at least fifteen minutes to administer.

We really need a drug of this kind, if it is safe. In patients operated on for acute abdominal lesions with beginning peritonitis, distention from paresis is a very serious complication, and if we can overcome this, the chances of recovery are increased. In postoperative intestinal distention, in cases with no peritonitis, this complication is less serious, but there are cases in which the ordinary means are very slow, and the patients may suffer two or three days of discomfort.

Before using hormonal or eserine, the stomach should be washed out and the patient given castor oil. The usual rectal enemas should then be administered. Now, if no flatus has passed and the distention is extreme and affecting the general condition of the patient, it is justifiable to employ one of these drugs. My personal experience has been with eserine only, but since the routine postoperative treatment already discussed has been instituted early and carried out faithfully, I have had to employ eserine less and less.

#### ANESTHESIA.

The most interesting developments during the past year have been the increasing number of surgeons who employ nitrous-oxide-and-oxygen as a routine anesthetic, the added interest in Crile's method of combined local and general anesthesia, anoci-anesthesia, and the

<sup>1</sup> Centralbl. f. Chir., 1901, S. 1361.

<sup>2</sup> Sackur, Centralbl. f. Chir., 1913, S. 990; Dittler and Mohr, Mitteilungen a. d. Grenzgeb., 1913, Band xxv, S. 903; Centralbl. f. Chir., 1913, S. 990.

increasing safety and efficiency of the intrapharyngeal and intratracheal anesthesia.

The selection, therefore, of the safest anesthetic is growing more difficult in the sense that the number of approved methods is increasing. For example, we have gotten along for years in operations on the upper and lower jaw with the so-called waking anesthesia usually with drop ether, but now and then with drop chloroform. It would be difficult to improve upon the results of Krönlein and his followers. Naturally, we must ask ourselves the question, Is intratracheal anesthesia as safe? We know it will be more satisfactory and convenient for the surgeon, but will it be as safe for the patient? I do not think this question can yet be answered.

In operations for large goitres, we must know at once that intratracheal anesthesia will be safer than any other method of general anesthesia, because the tube in the trachea will prevent just the accidents that have happened in the past from flattening of the tracheal tube due to the pressure of the goitre.

In some cases, I find, I must use chloroform. In the treatment of cancer of the tongue, floor of the mouth and cheek, we cannot employ ether. As the cauterization can be performed in a few minutes, light chloroform seems the anesthetic of choice. The paper which I delivered by invitation before the American Gynecological Society<sup>1</sup> this past May covers my personal experience with combined local and nitrous-oxide-and-oxygen anesthesia, and the advantage of blood-pressure records before, during, and after operation.

Crile<sup>2</sup> discusses his method of anoci-association and anesthesia.

The report<sup>3</sup> of the Committee on Anesthesia at Atlantic City, June 5, 1912, before the American Medical Association was made by Yandell Henderson. It advocates that hospitals should have expert anesthetists, that chloroform is not justified in major operations, recommends the use of morphine hypodermically before anesthesia, and most highly nitrous-oxide-and-oxygen anesthesia.

The American statistics on anesthesia are given by Gwathmey.<sup>4</sup>

The literature on anesthesia is immense, and space forbids any further discussion. As stated in the introduction, I get the impression that nitrous-oxide-and-oxygen is fast becoming the anesthetic of choice, and I am of the opinion that Crile's method of combined general and local anesthesia will ultimately win out. The newer methods, with intratracheal and intrapharyngeal anesthesia, must be introduced in large clinics. They have a definite field not only for intrathoracic work

<sup>1</sup> Railway Surgery Journal, August, 1913, vol. xix, p. 459; Transactions of American Gynecological Society, May, 1913.

<sup>2</sup> Surgery, Gynecology, and Obstetrics, 1913, vol. xvi, p. 627.

<sup>3</sup> Journal of the American Medical Association, 1912, vol. lviii, p. 1908.

<sup>4</sup> *Ibid.*, vol. lix, p. 1844.

which is impossible without them, but for other types of operations. The best drug for local anesthesia is novocain 1 to 400.

Quinine-and-urea can be employed to prevent postoperative pain in all cases. It should be used cautiously and in weak solutions. In large quantities, and in strong concentrations, it produces local necrosis. The results in its elimination of postoperative pain are seen chiefly in rectal work.

Spinal anesthesia is apparently not gaining favor, although there are a number of interesting reports from surgeons who have advocated it from the beginning. I am rather inclined to think that we will learn that it has a distinct field.

Very little has been written recently on rectal anesthesia, or on anesthesia with ethyl chloride. There are a few reports on arterial and quite a number on intravenous anesthesia.

### WOUND TREATMENT.

**Accidental Wounds.** Neither in war nor in civil life have we reached perfection in the treatment of these wounds. There is still the problem of prevention of infection, and of the treatment of hemorrhage. This problem confronts the layman or policeman who sees the injured one first, the country doctor as well as the young hospital surgeon. It confronts the parents when their children get cuts or bruises. Practically all of them make the same mistake, interference. It is difficult to educate ourselves that in most accidental wounds infection has taken place and that in the first aid to the injured the most important thing is not to add to this infection. Cover the open wound with the cleanest available material. If there is to be any interference with an accidental wound it should be done with the same technique and under the same environment as any other eporation.

There is only one complication in the wound which will justify the interference by the one who sees the injured person first, and that is hemorrhage. Ambrose Paré, many centuries ago, found that after a great battle the wounded about whom he had the greatest concern, because he and his assistants could give them no attention, were in better condition than those who had received the most expert care of himself and his assistants. This experience led Paré to develop his principle of non-interference.

Lister, when he began his carbolic-acid treatment of compound fractures, really established non-interference, because all he did was to pour a little carbolic acid on the open wound and cover it with a piece of lint wet in carbolic acid. His colleagues at the same time handled such wounds with their fingers and instruments, and added to the infection the bacteria of their own hands and those of the hospital. In

1865, when Lister began his carbolic-acid treatment, most patients with compound fractures who entered hospitals died of infection, so that it was the rule then to amputate at once for compound fracture. Hospitals in those days were really culture tubes of mixed infection. Undoubtedly, many patients with compound fractures not admitted to the hospital and not treated by surgeons with dirty hands, got well without Lister's carbolic-acid treatment, but no observer saw them. Such cases of compound fracture get well today when the only treatment is a clean handkerchief to cover the wound. Lister's carbolic-acid treatment is rarely employed today. Some years ago the Germans were of the opinion that simple irrigation with salt solution was sufficient, but now they advise the iodine technique, or alcohol.

The point is this: In accidental wounds, in the majority of cases, the infection which takes place is of a kind and degree which the tissues can take care of, and these wounds will all do well, providing they are protected from secondary infection.

If it happens that the accidental wound is primarily infected by an unusual or virulent organism, we have no evidence that any method of disinfection in the first dressing or at periods afterward will prevent these organisms from producing their local and general effect.

I remember many years ago reopening a stump of the leg four hours after the amputation. This man's leg had been crushed in a railroad accident, amputated in a barn without much precaution, and the patient sent at once to the Johns Hopkins Hospital. He was not shocked, but the stump was distended with blood. This stump was cleaned up with the most careful technique, opened, the blood clot washed out with 1 to 1000 bichloride, the bleeding points tied, the wound again irrigated, and closed with drainage. Twelve hours later we reamputated above the knee for a gas bacillus infection. Of course, in this case there was an interval of four hours, but I am inclined to the view that it would not have made much difference if the interval had been but forty minutes. The man recovered after the second amputation. Today, as I will discuss later under infections, I would not reamputate, but open the wound, make incisions, and place the limb in a bath.

The more experience I have with accidental wounds, and the more I come in contact with physicians and surgeons who treat these wounds first, the more do I become impressed with the fact that few have the proper point of view. They do not realize that in the majority of cases the primary infection is not sufficient to do harm, and that, in a few cases, the primary infection may be so virulent that no disinfection will control it.

It is unnecessary to treat all accidental wounds as if they were primarily infected in this virulent way. This would mean that every accidental wound should be enlarged, kept open and, if possible, placed in a continuous bath of hot salt solution.

There is one primary infection that we can prevent, and that is tetanus. There is no particular objection to the employment of the tetanus serum in every accidental wound, except the danger of anaphylaxis, and, in view of the number of sera now employed and the danger of repeated doses, no one should give a serum without good reason. When accidental wounds have been infected by garden earth, the dirt of streets contaminated with the manure of animals, or when the wound has been acquired near a stable or barn, the danger of tetanus is so great that the antitoxin should be given at once, unless there is a definite contra-indication. I have been employing the tetanus antitoxin as a routine in these cases since 1900, and I have never seen a case of tetanus among the cases so treated, nor have I had any serious serum sickness. During these years I have noticed in the newspapers from four to six deaths from tetanus a year exclusive of Fourth-of-July injuries. The most prominent accidental wound has been that from a rusty nail in the barn yard. In the Johns Hopkins Hospital, since the routine employment of the serum in the dispensary and wards, we have seen no cases of tetanus develop in the patients whose accidental wounds we have treated. Previous to this a few cases developed in the hospital, and a certain number of cases are now admitted. To my knowledge, none of these cases of tetanus had received the preventive serum.

We have as yet no other serum for the prevention of other infections in accidental wounds. The two most serious are streptococcus and the gas bacillus.

Now and then we can feel that these infections have taken place, and treat the wound accordingly. If a surgeon or nurse, a pathologist, or a bacteriologist receives a wound during an operation, or an autopsy on an infected case, or in the laboratory from a broken test tube, we should treat such a wound as primarily infected.

Wounds in certain regions, especially in the buttocks near the anus, run a great risk of being infected with gas bacilli and should be left open.

It is safer, in a stab or bullet wound of a joint, to perform arthrotomy and wash out the joint irrespective of any other clinical factors. With these few exceptions we can, in the majority of cases, treat the wound as if the primary infection was not serious enough to produce later trouble, that is, the wound may be closed. Drainage may be necessary in some cases. The deeper the wound, the greater the amount of fat; the poorer the circulation, the greater the indication for drainage.

In all lacerated and contused wounds we must bear in mind that even the slight primary infection may be more efficacious in the presence of necrotic tissue than in a clean-cut wound. Unless this torn and necrotic tissue can be completely excised, the wound should be more thoroughly drained or left open.

In some wounds, we must look for, and remove, foreign bodies.

The one foreign body that it is not necessary to remove is the bullet. In the first aid to the injured, therefore, every wound should be left absolutely alone, should not be handled, should be protected as quickly as possible with something clean. If you cannot get this "something," use nothing. The air is better than a dirty handkerchief. If the bullet has passed through the clothes of the patient, it is already infected from those clothes, and adding dirty clothes from another individual to protect the wound will only add to the infection. It is not necessary to cover the wound, unless you can cover it with something clean, or unless what you use is cleaner than what the wound might come in contact with during transportation.

If one cannot get something clean to cover the wound, it is often possible to get an antiseptic with which to saturate the cloth. The most available antiseptics are alcohol, turpentine, gasoline (now perhaps the most available) or any lubricating oil. Of course, if there is any opportunity to boil some rags, this is the best protective and least irritating dressing of all.

The thing that has impressed me most in my twenty odd years of experience with accidental wounds, is the rarity of severe infection after the most variegated primary treatment. Rarely does the expert surgeon have the opportunity to see or treat an accidental wound first. The wound has been treated where the patient was injured, often again in the dispensary by an inexperienced interne, and the patient arrives in the operating room, for the first time in a proper environment.

*Operative Wounds.* Practically, the technique under our control should prevent infection. Now and then, in isolated cases, the patient's skin may contain a virulent streptococcus, and erysipelas may follow a clean operation.

Dr. Halsted's article<sup>1</sup> interested me very much, because it took me back into the atmosphere of his operating room where I had found a technique far ahead of anything I had seen in this country at that time, and not equaled by any clinic which I visited later abroad.

This technique was established in 1889. There have been added to the methods then employed rubber gloves, gowns with sleeves, caps, and mouth covers.

The technique of cleansing the surgeon's hands and the skin of the patient consisted of washing with green soap and hot water, rinsing this off with water, then going over the skin with permanganate of potash followed by oxalic acid, then washing with bichloride of mercury.

In the beginning of Dr. Halsted's clinic, bichloride in solutions of 1 to 1000 was extensively used. Many of the wounds were irrigated with this solution.

Today very little change has taken place in the method of cleansing the hands of the surgeon, except the introduction of alcohol and the

<sup>1</sup> Journal of the American Medical Association, 1913, vol. lx, p. 1119.

shortening of the time in which the hands are kept in bichloride of mercury. It seems to be the consensus of opinion among surgeons today that, after washing with soap and water, the use of alcohol alone, perhaps the safest antiseptic, is sufficient. Denatured alcohol is now so cheap that the alcohol method is no longer expensive. In Dr. Halsted's clinic at the Johns Hopkins Hospital, and in Dr. Finney's at the Union Protestant Hospital, as well as in mine at St. Agnes' Hospital, permanganate and oxalic acid are still retained in the method of cleaning the hands of the nurses, student assistants, resident surgeons and surgeons, but most stress is placed upon alcohol. Personally, I find my skin in better condition when I use the permanganate and oxalic. I believe this additional cleansing may be discarded, but in a large clinic with many new and inexperienced assistants cleaning up, it is an additional safeguard and very little expense. But I take this opportunity to emphasize the importance of alcohol in cleansing the skin of the hands. The hands can be immersed in alcohol. I prefer the method of rubbing them with gauze saturated in alcohol. This alcohol cleansing of the hands becomes of additional value when the iodine technique is employed to cleanse the skin of the patient, because bichloride renders iodine extremely irritant. Years ago a prominent surgeon with a small infection of the finger placed the hands in iodine and then in a wet bichloride dressing. The dermatitis which followed led to gangrene and amputation. With the iodine technique, bichloride must be removed from the operating room, and it is fortunate that alcohol and tincture of iodine are friendly to the human skin when working together.

There is no doubt in my mind that the credit for introducing gloves in surgery belongs to Dr. Halsted and his clinic. Here, unquestionably, gloves were worn as a routine in all operations by the surgeon and his staff since February, 1897.

The effect of wearing rubber gloves on the healing of the wound I worked out carefully in the operation for hernia (Johns Hopkins Hospital Reports, vol. vii, 1899).

Before gloves were worn, and when the hernia operation was done with heavy silk tied under tension, the percentage of suppurations in 116 cases was 24. When we substituted silver wire as a buried suture, the suppurations fell to 4.2 per cent. in 330 cases. But when we introduced gloves, irrespective of whether the wound was closed with silver wire or silk, the suppurations fell to 1.8 per cent. in 226 cases.

During my last years as resident surgeon, when every detail of the technique of closure of a hernia was carefully followed, we did not have even a superficial skin suppuration in over 200 cases. It is my opinion that the hernia operation and the employment of silk in it, is not only the test of aseptic technique, but of gentleness in the handling of tissue.

In Dr. Halsted's clinic recently, the iodine technique has been introduced. The full 10 per cent. solution is employed, the skin is shaved

dry, the iodine employed just before operation. In some cases, it is immediately washed off with alcohol. This has the advantage of

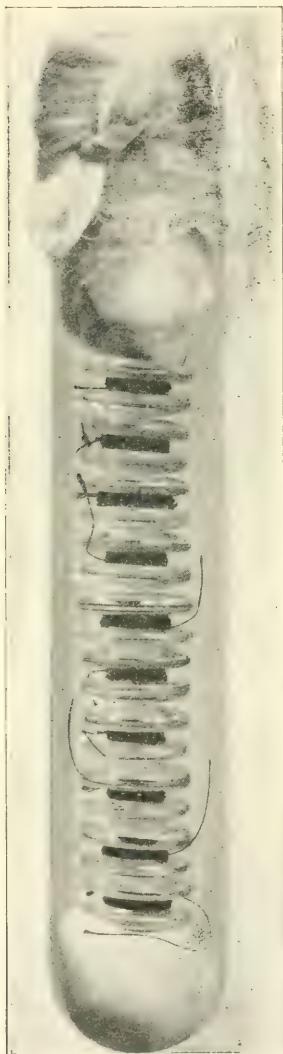


FIG. 27.—Ligature spools of glass. A spool is held in the left hand while the right unwinds only so much of the thread as may be required for the ligation of one vessel.

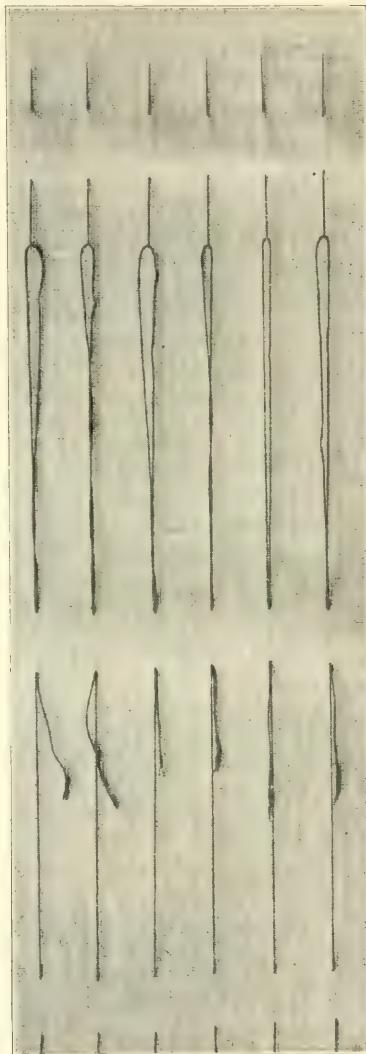


FIG. 28.—Reduced 3/5. To show method of basting the threaded needles. Silk No. C. Needle No. 7. We usually employ silk two sizes finer than this.

shortening the time of preparing the patient for operation. There is a strong objection now to anesthetize the patient for fifteen or twenty minutes simply to prepare the field of operation. In such cases, iodine

can be employed. But when the patient is not nervous, the preparation does not seem to be much of an ordeal.

In St. Agnes' Hospital, the majority of my cases are cleaned with soap and water followed by alcohol and ether. I am certain that the iodine technique is no safer than this, but infections of the wound today are so few that it is difficult, without a most painstaking investigation, to get at the causative factor or factors. As far as I can judge from the literature, and from the experience of my colleagues and of myself, the iodine technique may be looked upon as safe.

The healing of the wound in a perfect way depends upon other factors than asepsis or antisepsis. Dr. Halsted was one of the first to emphasize the importance of handling tissues gently, of clamping isolated vessels rather than masses of tissue, and of ligating with the finest silk.

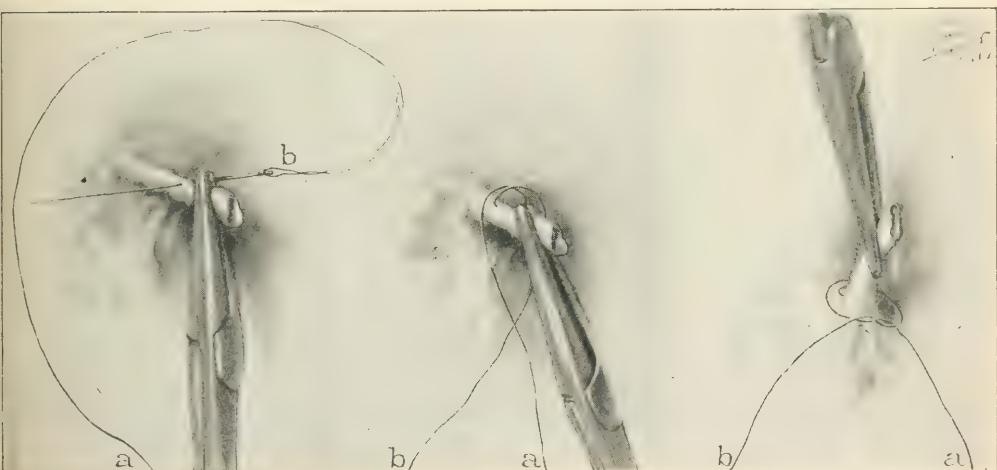


FIG. 29.—The ligation of an isolated vein or artery by transfixion. The vessel has been twisted to prevent bleeding from the needle-prick.

Today, so far as I am able to judge, the majority of surgeons prefer catgut, but many of these are not familiar with the fine silk wrapped on glass spools (Fig. 27) employed in the Halsted clinic, or the threaded straight needles (Fig. 28) with the same fine silk which can be employed for bleeding-points by passing the needle through the tissue and then ligating about the clamp (Fig. 29).

Some three years ago I purposely broke away from the silk technique and employed catgut almost as a routine. I found absolutely no advantage and many disadvantages. In the first place, one can ligate much more rapidly with silk; the convenience of the glass spool, especially in operations requiring many clamps, such as for cancer, is most helpful.

In some places, this fine silk is not strong enough, then catgut is

better than heavy silk. I find that I most often employ catgut in ligating omentum, for the ligation of mesenteric vessels in resection of the colon. Here it is difficult to get the vessel without some fat, and the fine silk is not strong enough.

Fine silk threaded on straight intestinal needles, on a curved intestinal needle, and on a small French needle, is most helpful in ligating vessels in thyroidectomy and in intestinal suture. I have given up catgut for mucous membrane suture in gastric and intestinal work, and employ three layers of this fine silk.

The disadvantage of catgut, and perhaps its chief danger, is seen in its routine employment for closing the wound made for the cure of hernia and the laparotomy wound. During my apprenticeship in Dr. Halsted's clinic from 1893 to 1899, and up until 1908, when I always closed hernial or laparotomy wounds with silk or silver wire, I never experienced a break down with protrusion of the viscera, although during this time it not infrequently happened in the hands of colleagues who employed catgut throughout. When I substituted catgut for silk at St. Agnes' Hospital, I soon had this experience. In one summer, two cases at St. Agnes' and two at the Johns Hopkins Hospital broke down, with prolapse of viscera. In all of these cases, at the second operation the wounds were closed with silver wire through and through all tissues. The patients have all recovered and no hernias developed.

I wish to emphasize this point, because, as I stated before, the majority of surgeons throughout the country are employing catgut.

In the past five years I have operated for a number of recurrent herniæ, first operated on by colleagues whose operations differ from mine only in the employment of catgut. At my operation I employed silk, and there have been no recurrences. Some years ago, in ten cases, I performed my usual operation for hernia, except that I employed catgut instead of silk. There have been two recurrences in this group, an observation which I had never made before in my own cases. I immediately went back to silk. The catgut employed was not kangaroo tendon or chromicized, but the ordinary ten- to twenty-day catgut.

When laparotomy wounds are closed throughout with catgut, irrespective of the nature of the operation, the extent of the incision, the condition of the patient, or the presence or absence of drainage, I am confident that if surgeons will but keep careful records of their cases, they will observe more breakdowns with evisceration (a very unpleasant complication) and more postoperative herniæ.

The thing most desired in a hernial or laparotomy wound is closure which will heal in such a way that there will be no immediate or subsequent protrusion of the viscera. It is quite true that now and then patients are so ill, or their lesions require so much drainage, that we cannot consider anything but a temporary closure of the abdominal wound. I am convinced, from my accumulated experience, that

surgeons who employ catgut as a routine in closing hernial and laparotomy wounds have more unnecessary postoperative herniae than surgeons who employ silk or silver wire. The silver wire need not be buried. It can pass through all the tissues.

I agree with Halsted that silk should always be employed in hernia.

For the closure of many laparotomy wounds, catgut is sufficient, but, in certain cases, this must be reinforced with silk and silver wire.

Much of the faulty healing of wounds today is due to a hematoma. This, I am confident, in the majority of cases, can be avoided. It is the result of carelessness or haste. When this haste is necessary, we must accept the hematoma as unavoidable in some cases, but, with patients in good condition, we should hold ourselves responsible for these secondary hematomas which give discomfort and increase the period of disability. In the beginning of abdominal surgery we had so little to do when we got into the abdomen, that we were interested in the making and closing of the wound. Now we have so much to do when we enter the abdominal cavity that we have lost, to a certain extent, our interest in the opening and shutting of the entering wound. It is my opinion that more care should be taken in closing laparotomy wounds, and that Dr. Halsted's remarks in regard to silk be read carefully.

Perfect healing, therefore, is not entirely a matter of antiseptic and aseptic technique, and, to repeat, the essentials are gentleness in handling tissues, clean cut rather than blunt dissection, ligation of the smallest bits of tissue with the finest silk, perfect approximation of tissues when closing without tension sufficient to strangulate, bloodless wounds to avoid hematomas, proper drainage when indicated, and the application of a dressing which will support the wound, close dead spaces by pressure and be comfortable.

These many minor details today rarely affect mortality, but they have much to do with comfort, shortening the period of disability, and, in some cases, with obviating secondary operations from a faulty closure of the wound.

Surgeons should strive not only for safe technique which has for its object the prevention of infection and dangerous hemorrhage, but for perfect technique which gives the patient the greatest assurance of the healing of the wound without any immediate or later consequences. So much is going on in surgery today that is more spectacular and more absorbing, that many of the finer points of technique are overlooked. One also should read Dr. Halsted's communication on operative technique in the *Johns Hopkins Hospital Reports*, vol. i.

**Wound Technique.** There is nothing of great importance in the treatment of accidental wounds, except what has already been said about non-interference.

For cleansing the hands of the surgeon and his assistants, alcohol

is becoming the antiseptic of choice. The cheapness of denatured alcohol by the Government formula fortunately makes our best therapeutic agent economical. For the preparation of the skin of the patient, iodine is fast gaining in favor. From my personal experience, both in Johns Hopkins Hospital and in St. Agnes' Hospital, I have been unable to determine that it is not as good as previous methods. If future experience proves this to be true, it has great advantages in the saving of time and simplicity. When iodine is used in the preparation of the skin of the patient, bichloride of mercury must be eliminated from the operating room. Any skin stained with iodine when in contact with a solution of bichloride, immediately becomes irritated, and, if the bichloride of mercury solution remains in contact with the iodized skin long, there is sure to be sloughing. I am inclined to think that many of the early reports of irritation from tincture of iodine were due to the accidental contact with the bichloride solution. With full-strength tincture of iodine, I have seen this irritation only when some bichloride has come in touch with the skin.

The tincture of iodine solution should be fresh. There seems to be no advantage to place it on the skin some hours before the operation. Alcohol can be employed to prevent iodine from running beyond the field of operation. I am not at all certain but we may find that scrubbing with alcohol is just as efficacious as the application of tincture of iodine.

When the hands are disinfected with alcohol and the gloves are, from time to time, immersed in alcohol during the operation, which is the technique that should always be employed when iodine is used on the field of operation, the danger of minute holes in the gloves is practically eliminated.

To repeat and to emphasize, if the iodine treatment is employed, eliminate bichloride of mercury from the operating room and from postoperative dressings. Substitute alcohol throughout for the disinfection of hands during operation, for the immersion of gloves, and for all postoperative dressings. Denatured alcohol is just as good as grain alcohol.

## INFECTIONS

**General.** There is nothing specially new in the treatment of general infection. The most important point is to recognize the local infection and eradicate it before it becomes general. All the recent literature on immunity and vaccines gives us as yet nothing but hope.

In the presence of general infection, as shown by fever, leukocytosis, and other phenomena of sepsis, the most important measures are: To increase elimination by increasing the water intake, best accomplished per rectum, or subcutaneously; to increase the elimination from the intestines by cathartics; when the temperature is high, to employ

cold sponges. It has been my experience that, in all infections and toxemias, the heart action is helped by the frequent application of ice to the precordium. The diet should be chiefly white of egg and broths. I have discontinued the use of milk. Of course, during this time we are doing all that is possible for the local infection. It seems to be the consensus of opinion that alcohol is contra-indicated. Pain should be relieved by morphine, but one should be very careful in the use of hypnotics to induce sleep, as they are depressants.

The literature on sugar therapy seems to indicate that some form of sugar should be given in the rectal or subcutaneous salt solution and perhaps, in desperate cases, intravenously.

Vorschuetz<sup>1</sup> is of the opinion from experimental investigation and clinical observation, that alkalies are helpful in general septic conditions. He claims that in sepsis there is increased acidity of the blood. He gives sodium bicarbonate from 6 to 20 grams per day by mouth or per rectum, and claims good results.

I have employed bicarbonate of soda for some years. The theory of chemotherapy has been established by Ehrlich, and salvarsan for syphilis is successful. But for the ordinary general infections from staphylococci, streptococci, pneumococci, colon bacilli, and general typhoid bacteremia, we have as yet not established a successful chemotherapeutic agent.

The stock vaccines and antitoxins on the market should not be employed. Collargol and other intravenous chemotherapeutic agents, although still employed, have not received general confirmation. Our treatment, therefore, of general infection resolves itself to a very simple scheme in which drugs play a minor part. It is to be hoped, however, that some specific treatment will be established, because even today the number of deaths from general septic infection is large.

**Local Infection.** Whether an accidental or operative wound, or an infection in which the wound is insignificant, the best treatment is by incision or excision. It is quite true that some local infections take care of themselves without this operative intervention. The general principles of non-operative treatment have been established by Bier. The local inflammatory process can be increased by active or passive hyperemia. The local wound should not be irritated, but kept moist. It is important, however, for the surgeon to know when and how to interfere; when to use non-operative measures only, when incision, when excision.

There is one great exception to the rule of operative interference, and that is anthrax. On the whole, the local infection of anthrax is best left alone. If anything is done, it should be radical excision with the cautery.

Erythema, lymphangitis, tender and swollen neighboring lymphatic

<sup>1</sup> Centralbl. f. Chir., 1913, Supl. S. 21.

glands are indications that the local infection is spreading. If these subside quickly under hyperemia and non-operative treatment, it is safe to delay; if not, the local wound should be attacked at once by incision or excision. The latter is always to be preferred, and, in the majority of cases, the cautery is better than the knife. The wound should be left open.

For open infected wounds and ulcers, Reuterskioeld<sup>1</sup> recommends Pfannenstiel's treatment for lupus. This consists in precipitating into the infected tissue iodine from KI or NaI given internally, and bringing the surface of the wound in contact with dressings kept saturated with peroxide of hydrogen slightly acidulated with acetic acid.

Reuterskioeld has developed the technique as follows: Two bottles of about 8 oz. capacity are provided with rubber tubes through which slightly moistened cotton wicks have been drawn so as to protrude at both ends. One of the bottles is filled with the peroxide of hydrogen and is placed above the level of the wound; the other bottle serves to receive the drainage, and should therefore be below the level of the wound.

The wound is now most carefully lined with a piece of gauze saturated with the hydrogen peroxide so that it is everywhere in intimate contact with the walls and fundus of the wound. Over this is spread the wick from the supplying bottle; over this again a thin layer of gauze; over this a small piece of protective rubber, smaller in circumference than the wound; then again some gauze; over this the moist wick of the draining bottle; over this again gauze sufficient to fill the cavity of the wound to the surface, and over all protective. The skin about the wound is covered with a thick layer of lanolin to the very border of the wound and the protective then made airtight with a layer of lanolin spread over its edges. The tubes pass through holes in the protective and the connection is made airtight by dissolving the rubber of a small piece of protective in a few drops of chloroform around the opening in the protective cover.

The iodide of potassium dose is distributed over the day as follows: First dose one-third, second dose one-sixth, third dose one-sixth, and fourth and last dose one-third of the daily quantity determined for the particular patient.

The normal combination is as follows: 3 grams of potassium iodide per day in doses as above by the mouth, with continuous irrigation of the wound as described above with 3 per cent. hydrogen peroxide acidulated with 1 per cent. acetic acid.

Doses proportionately smaller than the above act more slowly and superficially. After an ulcer or wound has become clean under the full dosage, epithelization and healing progress more rapidly with smaller doses, say 2 grams potassium iodide, 2 per cent. hydrogen peroxide and  $\frac{1}{2}$  per cent. acetic acid, and, later, 1 gram potassium iodide,

<sup>1</sup> Archiv f. klin Chir., 1912, Band xviii, S. 796.

1 per cent. hydrogen peroxide and  $\frac{1}{4}$  per cent. acetic acid. The process of healing is still more hastened by skin-grafting combined with the last-named dosage (1 gram potassium iodide, 1 per cent. hydrogen peroxide, and  $\frac{1}{4}$  per cent. acetic acid). When the patient shows signs of gastric disturbances due to the iodide of potassium, the drug may be administered per rectum in the same doses.

Reuterskioeld has employed this method of treatment for leg ulcers, both acute and chronic; for infected wounds contaminated with impurities, pus, bacteria, etc.; for acute and chronic empyema. The method has also been adapted for use in the dispensary for felonies and other lesions and infections which ordinarily do not demand the patient's admission to the hospital. For ambulatory treatment, the bottles used are flat and are fastened to the skin of the patient with adhesive strips—one above the other below the level of the irrigated surface.

**Gas Phlegmons.** The literature on the special infections is relatively scanty, and there is nothing specially new or important, except the use of oxygen in the treatment of gas phlegmons. W. Mueller<sup>1</sup> and others report on their experience with the subcutaneous injection of oxygen gas into and around the focus of emphysematous cellulitis. The object of the oxygen is to prevent the growth of the anaërobic gas bacillus. Mueller reports a good result without incision, other reporters employ incisions. The entire subject of gas phlegmons has been previously discussed here (PROGRESSIVE MEDICINE, December, 1899, p. 158). My accumulated experience since then confirms the views expressed. The results have been uniformly good from open incision and amputation when indicated. Cases have recovered when the amputation passed through emphysematous, but non-necrotic tissue, that is, above the area of gangrene. The wounds have always been left open, and some have been placed in a bath. But there are cases in which it is impossible to eradicate the infected tissue, and it is possible that the oxygen-gas treatment may be helpful.

Since reading about this treatment, I have not had the opportunity to try it.

#### TUMORS.

Surgery can be chiefly interested only in tumors which, in the beginning, are local diseases and which can be cured by complete removal. Such lesions as multiple myeloma, Hodgkin's disease, lymphosarcoma, multiple sarcoma of the skin, and the metastases to regions beyond the field of operative venture cannot excite the interest of the practical surgeon.

Early in surgery so few patients submitted to operations in the beginning of the neoplastic formation that, as a rule, the characteristic

<sup>1</sup> Centralbl. f. Chir., 1913, Supl., S. 20.

of the benign or the malignant lesion was so clear that even the less experienced surgeon was able to make a diagnosis. However, at that time, although the surgery of malignant tumors was dramatic and may have given temporary relief in a few cases, yet permanent cures were very infrequent.

Pathologists became interested in the various cellular pictures of the inflammatory and neoplastic formations and reached a point of great accuracy in differential diagnosis. But, as a rule, whether from operation or autopsy, the obtained tumor tissue represented the late stage of the disease, when diagnosis was less difficult. The pathologists who made the diagnosis rarely had an opportunity to check it with the ultimate result.

At the present time our views with regard to tumors are rapidly changing. We wish to increase the number of cures for malignant disease. We know this can be done by educating the people to seek advice earlier, and by better surgery in this period.

Surgeons' experience with early lesions is increasing, and this is giving pathologists an opportunity to see the cellular picture of many diseases at a period with which they have not been familiar heretofore except in isolated cases.

This experience has brought out the fact that malignant disease in its earlier and most curable stage may have no clinical symptom or sign to distinguish it from a benign lesion. Now, this is the time for operation. The more difficult the diagnosis, the better the prognosis.

We may divide these early lesions, in which a clinical diagnosis between the benign and the malignant cannot be made, into two groups.

In the first, the local lesion can be radically excised without danger of mutilation, and when this is done it makes little difference what the microscope reveals. The operation has not been too extensive for the benign, but has been sufficiently radical for the possible malignant.

This makes surgical diagnosis very much easier, because, in the early stage, the gross and cellular picture may still leave the most experienced surgeons and best trained cellular pathologist in doubt.

There are many lesions which can be excised in this radical way without danger and without mutilation. For example: The dermoid cyst of the scalp has a pretty distinct clinical picture. It is sometimes called a wen. In the past, most surgeons and physicians have looked upon them as insignificant lesions. They are generally turned over to the younger students in the dispensary for operation. Two so-called benign dermoid cysts of the scalp were sent to the surgical pathological laboratory of the Johns Hopkins Hospital with this clinical diagnosis, having been removed in the dispensary by students. The operation was well done for a dermoid, but was not sufficient in these two cases, because carcinomatous change had taken place in the wall of the dermoid. Again, a colleague in gynecology, after performing what he

considered the major operation—a plastic operation on the vaginal outlet, asked his assistant to take out a wen of the scalp. It was sent to the laboratory and proved to be a perithelial angiosarcoma. Now, as a matter of fact, after investigating the benign and malignant tumors of the scalp which may appear clinically as wens, I find that the probability of malignancy is almost 10 per cent. in the single tumors, that is, if we exclude multiple dermoids of the scalp and dermoids in the very young and only consider those subepidermal cystic tumors in adults at the ages in which we may encounter the cancerous dermoid, or the sarcomatous cyst.

To excise radically a dermoid cyst of the scalp under novocain is really no more of an operation than to shell it out.

It is the result of surgical experience, based upon carefully recorded clinical and pathological examinations, that have allowed us to become familiar with the potential dangers of such a simple lesion as, clinically, a dermoid cyst of the scalp.

This experience with dermoid cysts of the scalp is by no means unusual or unique. I can cite many other examples. That we have not appreciated these possibilities more in the past, is due to the fact that the clinician's records are either incomplete, or, if complete, he has paid little attention to them.

In the treatment of tumors today, we are still struggling in the harness of many traditional ideas. The most difficult one to break away from is, that when a tumor is clinically benign it may be treated as benign and removed by enucleation, or a very restricted operation, and, should the microscope later prove it to be malignant, then something more can be done. When the lesion is clinically malignant, perform a radical operation.

My investigation shows that in the period in which the radical operation for cancer was becoming sufficiently radical to accomplish cures, *e. g.*, Halsted's operation for cancer of the breast, many opportunities for increasing the number of cures were lost by confining this radical operation to neoplasms clinically malignant.

In the second group, an operation sufficiently radical to give the patient the best assurance of a cure would be dangerous, or, at least, more dangerous and more or less mutilating, and such an operation would be unnecessary if the lesion proved to be benign.

In this group, therefore, the diagnosis must be made. We have no test for malignancy. There is only one way to make the diagnosis—expose the disease with the knife, decide as to its nature from the gross appearance, or make a frozen section.

What is one to do when still in doubt after having exhausted clinical, gross, and microscopic methods of diagnosis? This question cannot be answered in general. It varies with the different localizations of the lesion but may be expressed somewhat in this way: When a surgeon

explores a lump in the breast and is unable to feel certain that it is benign, he should perform the radical operation for cancer. The only disadvantage of such a procedure to the patient, if the lesion were benign, would be the loss of the breast, while if it proved to be malignant, her chances of a cure by this procedure would be 80 per cent. or more. On the other hand, if the doubtful lump had simply been excised and the complete operation for cancer done later, after a more careful microscopic study, the probability of a cure of the patient would, from my experience, be reduced from 80 per cent. to almost *nil*.

When a surgeon explores a periosteal or medullary lesion of the bone and is still in doubt after his clinical, gross, and microscopic evidence has become available, he should treat the lesion conservatively, as belonging to the benign or less malignant types. This rule holds good, because experience has shown that the less malignant lesions are cured by less radical procedures, while the more and most malignant usually kill by metastasis irrespective of the local operation.

Syphilitic and traumatic periostitis, with or without bone formation, may be difficult to differentiate from periosteal sarcoma with or without bone formation in the early stage. You may find Röntgenologists who feel they can make a differential diagnosis from the *x*-rays, but either they have not checked their diagnosis, or they have forgotten their mistakes. I had the good fortune to study many plates of bone lesions with the most experienced Röntgenologists and have found that the things revealed at the operation and confirmed by the microscope have not been what we expected to find from the *x*-ray study in a number of cases. So far, in my experience, a positive Wassermann reaction, followed by intravenous salvarsan, will immediately have an effect upon the luetic periostitis. But I shall still be skeptical of this therapeutic test if there is any symptom to arouse suspicion as to the possibility of a periosteal sarcoma. This test must always be made. In the past few years I have had opportunity to see three patients with luetic periostitis who would have lost their limbs on the diagnosis of sarcoma had they consented. I have not seen any cases of periosteal sarcoma giving a positive Wassermann reaction, but I have records of five cases of cancer in the region of the mouth and lower jaw where the positive Wassermann reaction led to delay in spite of the fact that salvarsan and the old treatment with iodides and mercury had no apparent effect.

The earlier individuals seek advice, the more difficult will be the diagnosis in the majority of cases.

The subject of tumors has been thoroughly discussed in the previous numbers of PROGRESSIVE MEDICINE, with illustrations, and in recent years much stress has been laid upon the PRECANCEROUS LESION and the etiological factors. Space forbids this year to discuss the literature which is beginning to accumulate on these more important phases,

the precancerous lesion, methods of diagnosis, and the proper methods of treatment for a definite type of tumor in a definite localization. During the past year I<sup>1</sup> have contributed the following articles on this subject: The Added Responsibility of the Surgeon When Called upon to Treat Surgical Lesions in Their Earlier Stages (delivered before the Surgical Section of the American Medical Association). The Diagnosis and Treatment of Borderline Pathological Lesions<sup>2</sup> (delivered before the American Surgical Association). The Control of Cancer (address before the Lehigh Valley Medical Society, June 17, 1913). Can it be Proved from Clinical and Pathological Records That the Number of Cures of Cancer will be Greatly Increased by the Proper Excision in the Earliest Precancerous or Cancerous Stage of the Local Disease? (paper delivered before the American Cancer Research Association in May, 1913).

### SURGERY OF SPECIAL TISSUES.

**Skin.** The most interesting and frequent lesions of the epidermis and subcutaneous tissue have been discussed under tumors and infections, but there are some lesions which are more properly discussed under this heading.

**X-RAY DERMATITIS AND ULCERS.** Pagenstecher,<sup>3</sup> in reporting a successful case in which the huge ulcer was excised (Fig. 30) and skin-grafted with Thiersch grafts (Fig. 31), agrees with Porter, of Boston, that the proper treatment of the more extensive burn is immediate radical excision. The injured tissues should be excised until healthy, bleeding tissue is exposed. This method relieves pain, saves months and often years of discomfort, and protects from carcinoma,

Raymond C. Turck<sup>4</sup> and Adamson, Rawling and Jones<sup>5</sup> also advocate the early radical excision and skin-grafting. These reports indicate that *x-ray* dermatitis with its resultant ulcer and possible later cancer is still being observed in spite of the now well-known precautionary measures. With well-trained Röntgenologists this danger has been practically eliminated, except when the rays are employed repeatedly for therapeutic purposes. I have observed this year two cases in which the *x-ray* treatment was apparently given by competent men. One patient was a child, aged five years, who suffered from ring-worms of the scalp. Repeated exposures to the *x-rays* cured the ring-worm, but resulted in a dermatitis which has destroyed most of the hair and left two excavated ulcers the size of silver dollars. In the second case, the

<sup>1</sup> Journal of the American Medical Association, 1913, vol. lxi, p. 911.

<sup>2</sup> Surgery, Gynecology, and Obstetrics, 1913, vol. xvii, p. 61 (abstract), and Transactions of American Surgical Association, 1913.

<sup>3</sup> Beiträg. z. klin. Chir., 1912, Band lxxxi, 310.

<sup>4</sup> Annals of Surgery, 1911, vol. liii, p. 47.

<sup>5</sup> Centralbl. f. Chir., 1910, S. 651.

patient was an adult, aged thirty-five years. The rays were employed for psoriasis. This has apparently been cured, but extensive dermatitis



FIG. 30



FIG. 31

on the outer surface of the thigh and leg resulted. In addition to that, myositis with contraction of both knees to a right angle, and, in the lesion on the left leg and thigh, carcinoma developed (Fig. 32).

This possibility, therefore, must be borne in mind, and if the complication does take place, the lesion should be at once excised radically and the defect covered with Thiersch grafts.



FIG. 32

Freund and Kaminer<sup>1</sup> are of the opinion, from their clinical and chemical investigation, that radium used in conjunction with  $x$ -rays may allow the application of toxic doses of the  $x$ -rays without resultant dermatitis, or, if the  $x$ -ray dermatitis does develop, the radium may restore the tissues to normal. Should this prove true, it might allow the employment of repeated doses of  $x$ -rays now considered excessive for therapeutic purposes.

**SKIN-GRAFTING.** In my contribution last year I discussed chiefly the technique of taking the Thiersch graft, but did not go into details of the preparation of the open wound, or the different methods of treatment after transplantation. In the past year I had some very difficult cases, and have gone back to the open-wound treatment. I find that this method, according to Brüning,<sup>2</sup> was first advocated by Wagner and by Bernhard. The latter makes a second contribution.<sup>3</sup> Then Weischer<sup>4</sup> reports his failures with this method in some cases, and this induced Goldmann<sup>5</sup> to make a second report from his clinic.

Irrespective of the base on which the Thiersch graft is placed, Goldmann calls attention to the fact that this graft is held in place by cohesion and that the graft becomes firmly fixed forty-eight hours or

<sup>1</sup> *Surgery, Gynecology, and Obstetrics*, 1913, vol. xvii, Abstracts, p. 71.

<sup>2</sup> *Centralbl. f. Chir.*, 1904, p. 881.

<sup>3</sup> *Deutsch. Zeitschr. f. Chir.*, 1905, Band lxxviii, S. 574.

<sup>4</sup> *Centralbl. f. Chir.*, 1906, S. 689.

<sup>5</sup> *Ibid.*, S. 793.

sooner, and the success of the "take" depends upon the treatment in the first forty-eight hours. If the grafts are not covered with any dressing, drying in the air adds to the firmness of the first fixation. In very large grafts, and in small grafts in certain positions, it is difficult to put on a dressing which may not move and displace the graft. In addition, in those cases in which it is impossible to cover the entire ulcer with grafts, the secretion of the ungrafted surface is more apt to run and injure the fresh graft under a dressing than when left exposed to the air. It is quite true that after forty-eight hours secretion may collect under the scab of the first dried secretion and give rise to discomfort and even fever, but now the grafts are fixed, and we can keep the open surface clean by salt irrigation and moist-salt or oil dressings. From my recent experience, and from the reading of this older literature I am confident that we have forgotten this well-recognized and established open-wound treatment of skin-grafting, which in certain selected cases will give better results than any form of dressing. The same is true of extensive, recent burns.

I trust next year to have space to give an elaborate discussion of the preparation of the wound and the various methods of after-treatment of skin grafts. From my observation in some clinics, skin-grafting is becoming a lost art. In other clinics, in spite of the extensive literature and possible good results, the art has never been acquired.

John Staige Davis has done very much to bring this subject up to date in American literature, and I have discussed his various contributions in previous numbers of *PROGRESSIVE MEDICINE*. Porter, too, in his splendid work on *x-ray* carcinoma, has shown the possibilities of skin-grafting, when all the details of the technique are conscientiously followed.

**GRAFTING OF AMNIOTIC MEMBRANE.** Stern<sup>1</sup> reports his experience with using this embryonic tissue for ulcers, burns, and scalds, and traumatic, open wounds.

The technique employed in preserving the amniotic graft was suggested to Stern by Alexis Carrel.<sup>2</sup>

For the details of this technique I refer to the original paper of Stern. He has not yet had enough experience to know whether this graft takes as well as true skin, but in many cases it may be difficult for various reasons to take skin grafts from the patient. In such instances, the amniotic graft should be attempted. If it does not take, nothing is lost, and the patient is not subjected to any painful or dangerous operation. We frequently have cases of this kind, and results of grafts from other individuals are not particularly satisfactory.

**SCARLET R IN THE TREATMENT OF GRANULATING WOUNDS.** This was discussed last year. John Staige Davis, of Baltimore, has con-

<sup>1</sup> *Journal of the American Medical Association*, 1913, vol. lx, p. 973.

<sup>2</sup> *Ibid.*, 1912, vol. lix, p. 523.

tributed most to American literature, and in his contribution<sup>1</sup> one will find the entire question fully analyzed with the literature. Davis is of the opinion, from his animal experiments and clinical experience, that the treatment of the ulcerating surface with an ointment of scarlet R, or its active principle amido-azotoluol (Merck), is a great improvement over all other methods.

My own clinical observations have been unable to confirm this. I have always felt that the fault in the healing of an ulcer was not due to the inactivity of the epithelium at the edge, but to the character of the granulation tissue on the surface of the ulcer and the circulation in the tissue at the base. Granting that scarlet R, or its active principle, does increase the activity of the epithelium, it is theoretically proved that this epithelium, as it grows over the granulating surface, must have proper nourishment. Now, if the base of the ulcer has good circulation and the granulation tissue is healthy, clinical experience shows that epidermization takes place quickly enough, and that we do not need any special stimulation of epithelial activity. In addition, in more chronic ulcers of long duration, we have sufficient clinical evidence to show that the epithelial activity at the edge of the ulcer may be excessive. This is shown in thickening of the skin, keratosis of its surface, downgrowth of the papillary body, and atypical growth of epithelium into the granulation tissue. Not infrequently malignant epithelial growth takes place with the development of carcinoma. It is my opinion, therefore, that the employment of scarlet R may be dangerous in chronic ulcer, especially in old *x*-ray-burn ulcers.

This personal opinion of my own is confirmed to a certain extent by Dobrowolskaya,<sup>2</sup> from Grekow's clinic in St. Petersburg. In eleven cases, the granulating wound was gotten into as good a condition as possible, and divided into two equal parts: one-half was treated with scarlet R, or its active principle, and the other with the dry, aseptic dressing. The frequency of the dressings and the methods of cleanliness were the same for the entire field. In only one case did measurements show any increase in the rapidity of epidermization in the scarlet R area, and in this not sufficient to be of any consequence. This observer carefully considers all the literature, and comes to the conclusion that this method has no advantages over the well-established method of treatment. Nothing, however, is recorded as to the actual development of carcinoma in ulcers so treated, but this, of course, does not preclude the possibility.

Parin<sup>3</sup> repeats the experiments of Fischer by injecting the ear of rabbits with scarlet R, and confirms the previous experimental work that

<sup>1</sup> Journal of the American Medical Association, 1912, vol. lix, p. 65; Annals of Surgery, 1911, vol. liii, p. 702; Ibid., 1910, vol. li, p. 40.

<sup>2</sup> Beitr. z. klin. Chir., 1913, Band lxxxiii, S. 127.

<sup>3</sup> Centralbl. f. Chir., 1912, S. 1060.

this material, or its active principle, does stimulate epithelial growth of the epidermis and the epithelium of the hair follicles and glands. When injected into the connective tissue, it also excites an inflammatory reaction, often with the production of giant cells. Histologically, the epithelial overgrowth may resemble carcinoma, but beyond this, in animal experiments, no further evidence of malignancy has developed. Parin then gives his experience with 11 cases. He is of the opinion that before the use of this ointment everything must be done to get the granulation tissue in good condition, and that it hastens healing.

I see no objection to trying this ointment in fresh wounds, but I would advise against its use in all chronic ulcers and  $\alpha$ -ray burns. Here the entire lesion should be excised, and the healthy tissue thus exposed covered with skin grafts.



FIG. 33

**TUBERCULOSIS OF THE SKIN.** From my clinical experience with tuberculosis of the skin of the extremities, I am of the opinion that the most permanent treatment, and the one which accomplishes results in the quickest time, is local excision, later with the removal of the glands in the axilla or groin, if they are enlarged and do not subside after the removal of the local area. Even very large areas can be excised and the wound grafted. It is the best treatment for the most minute lesion—the so-called butcher's tubercle. Fig. 33 illustrates a tubercle on the

dorsum of the hand of a pathologist, and Figs. 34 and 35 the high-and low-power microscopic picture. I have had very little experience with

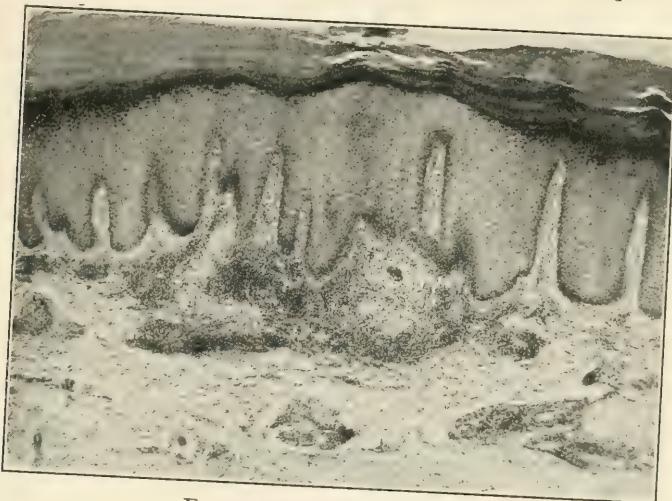


FIG. 34.—Butcher's tubercle.

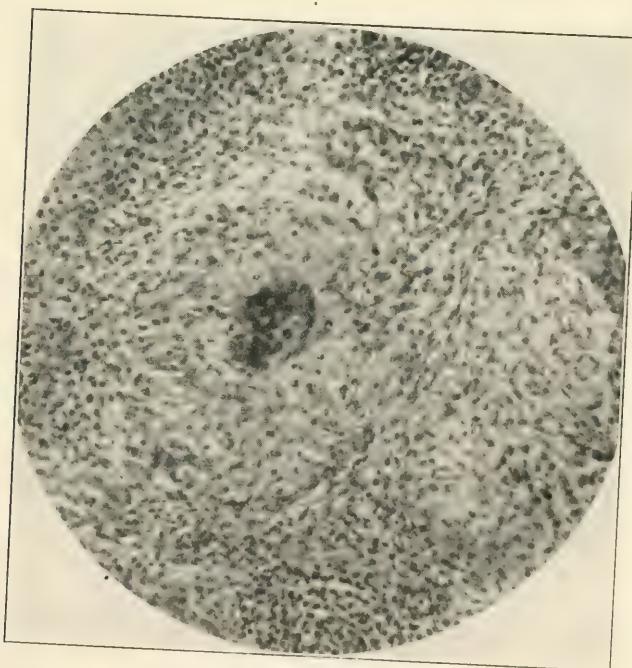


FIG. 35.—Butcher's tubercle.

tuberculosis of the skin of the face, but I believe in many cases cures will be accomplished more rapidly by excision in selected cases. The

literature is full of treatment with  $x$ -rays,<sup>1</sup> with heliotherapy,<sup>2</sup> with tuberculin,<sup>3</sup> with iodine,<sup>4</sup> with trypsin<sup>5</sup> and with copper salts.<sup>6</sup>

In the majority of cases, tuberculosis of the skin in its onset is a relatively small lesion, and can be easily removed without deformity.

In the differential diagnosis between this and non-tubercular skin lesions, Sternberg<sup>7</sup> calls attention to the fact that if the von Pirquet test is made near the skin lesion, there will be no reaction in acne and other non-tubercular skin diseases, but in tuberculosis there will be a definite reaction.

Poncet and Leriche<sup>8</sup> have contributed a number of articles to a skin lesion which they call "inflammatory tuberculosis." In this type, the skin lesion is toxic from a tubercular focus elsewhere. The local area of inflammation shows no evidence, histologically, of tuberculosis, nor can tubercle bacilli be demonstrated, but it does react to the tuberculin test. I have never seen a case of this kind, at least to recognize it.

Another reason for excising tuberculosis, especially in chronic cases of long standing, is the possibility of carcinoma. Lupus is one of the precancerous lesions.

### BLOODVESSELS.

**Tumors of Bloodvessels.** This is the first opportunity I have had to call attention to this very rare lesion. G. Ferrarini<sup>9</sup> reports two lipomas in the sheath of the carotid artery and one fibrosarcoma in the wall of the femoral. He gives the entire literature on primary tumors of the vessel sheaths.

H. Auffermann<sup>10</sup> describes a fibrospindle-and-giant-cell sarcoma in the sheath of the aorta. The patient had been ill three years; no diagnosis was made. The lesion was found at autopsy. He finds two other cases in the literature.

**Injury of Bloodvessels.** Now that vessel suture and transplantation of pieces of vessels into the defects has been made possible by the experimental work of Carrel and others, the surgeons' armamentarium for accidental and operative injuries to the larger vessels is almost complete. Previous to this the surgeon had to content himself with

<sup>1</sup> Ney, *Deutsch. Zeitschr. f. Chir.*, 1913, Band exxi, S. 256.

<sup>2</sup> Leriche, *Deutsch. Zeitschr. f. Chir.*, 1913, Band cxxii, S. 150.

<sup>3</sup> Bungart, *Deutsch. Zeitschr. f. Chir.*, 1912, Band exxii, S. 243.

<sup>4</sup> Felix Franke, *Centralbl. f. Chir.*, 1911, S. 953.

<sup>5</sup> Jockmann, *Centralbl. f. Chir.*, 1911, S. 904.

<sup>6</sup> Strauss, *Surgery, Gynecology, and Obstetrics*, 1913, vol. xvii, Abstract, p. 57.

<sup>7</sup> *Centralbl. f. Chir.*, 1911, S. 735.

<sup>8</sup> Lyon Méd., February 4, 1912; *Journal of the American Medical Association*, 1912, vol. lviii, p. 821.

<sup>9</sup> *Centralbl. f. Chir.*, 1913, S. 1020.

<sup>10</sup> *Ibid.*, 1912, S. 496.

ligation, and trust to collateral circulation to prevent gangrene. Gangrene was not an infrequent result when these ligations saved the patient's life from hemorrhage. The number of cases of vessel suture after injury reported in the literature is increasing, and there are many contributions to the technique.

There is one arterial injury, however, which may be overlooked—contusion of the main artery with rupture of the intima, but without rupture of the external coat. Thrombosis takes place quickly. In such cases there is no hemorrhage, either in the open wound, nor a tumor in the subcutaneous wound. The condition can be recognized clinically, as the patient complains of pain and numbness; examination of the hand or foot will reveal absence of pulsation in the peripheral vessels and anesthesia. This is the time to cut down upon the contused artery, resect the area, remove the clot, and restore the continuity by suture. However, since I first called attention to this rare injury (*Traumatic Gangrene from Rupture of the Inner Arterial Coats*, PROGRESSIVE MEDICINE, December, 1899, p. 187) I have found nothing in the literature. I am inclined to the opinion that it is due to the fact that this possibility is not borne in mind, and the diagnosis is not made sufficiently early. When there is an external wound and hemorrhage, or an enlarging swelling in a subcutaneous wound, the diagnosis of complete laceration of a large vessel is not difficult.

J. J. Buchanan,<sup>1</sup> of Pittsburg, reports a successful circular resection and suture of the axillary artery for a transverse laceration produced by fracture-dislocation of the anatomical neck of the humerus. It is rather interesting that there were no signs of hemorrhage after the injury, but no examinations were made of the radial pulse. A few hours after the injury the patient was examined under ether, and, later, an *x*-rays taken. Twenty-four hours later it was decided to operate, in order to reduce the fracture. As the fragment was lifted, there was a squirt of blood from a partial laceration of the axillary artery. The fragment, therefore, which had torn the artery, had, by its pressure, acted as a hemostat. The vessel was, without much difficulty, sutured end-to-end after resecting the lacerated tissue. No radial pulse, however, has been observed since the operation. We, therefore, have no evidence that the suture was successful. We also know that ligation of the axillary artery in this position is rarely followed by gangrene. Buchanan then collects from the literature twenty-nine cases of circular suture of the artery.

Harald Fowelin<sup>2</sup> reports two interesting cases—a partial injury of the brachial artery and a complete tear of the femoral artery, associated with an oblique tear of the vein. Both injuries were due to bullet wounds; both patients were admitted within three hours after the

<sup>1</sup> *Surgery, Gynecology, and Obstetrics*, 1912, vol. xv, p. 648.

<sup>2</sup> *Beitr. z. klin. Chir.*, 1913, Band, lxxxiii, S. 56.

accident and operated on. It is interesting to note that, in these two cases, a weak peripheral pulse could be palpated. In the case with injury of the femoral artery and vein, von Wahl's method of auscultation was not forgotten and the diagnostic sound of arterial injury heard. In both cases, the extremity was discolored, cold and numb—definite signs of impaired circulation; in both, there was evidence of hematoma about the bullet wound; there was very little external hemorrhage. Considerable difficulty was encountered in isolating the vessels; the partial wound in the brachial artery was sutured; the femoral artery, after removing the torn ends, was united by circular suture, but, as the injury of the femoral vein was below the saphenous, it was considered safer to ligate it rather than to attempt to restore its continuity by suture. Both patients recovered with complete restoration of peripheral pulsation.

**TECHNIQUE OF VESSEL SUTURE.** All the writers who report cases mention the importance of technique, and advise surgeons to familiarize themselves with all of these matters by operation upon animals. Every modern operating room now should be supplied with the few special necessary instruments, especially the fine, straight needles threaded with fine silk. These should be kept in sterile liquid vaselin. The most important point, in addition to manual dexterity, which can be quickly acquired by experimental work, is good technique, the gentlest handling of the vessel, with fingers rather than instruments, the protection of all the exposed tissue by gauze saturated in liquid vaselin. The object of this is to reduce the danger of coagulation and thrombosis. The sutures should come in contact with no exposed tissue or blood, except the vessel to be sutured. Crile's little bull-dog clamps are most satisfactory for temporary occlusion during suture.

J. Sheldon Horsley,<sup>1</sup> of Richmond, reports, with illustrations, a new instrument to facilitate the end-to-end suture of vessels. This was demonstrated at the last meeting of the American Medical Association in Minneapolis. I refer to the original for the details, and for the examination of the illustrations, because to make it clear one would have to give the entire article. As I saw the demonstration, I more confidently recommend the instrument. Personally, I had no particular difficulty with Carrel's original method, but this instrument might be of great help when the suture must be made in a deep, difficult position.

Porta,<sup>2</sup> from Biondi's clinic in Siena, reports a new method of vessel suture. The six illustrations explain themselves (Fig. 11). One would have to practise this method on animals before recommending it as a substitute for Carrel's well-recognized and successful method.

Walter M. Boothby,<sup>3</sup> of Boston, has devised a method to aid in trans-

<sup>1</sup> *Annals of Surgery*, 1912, vol. lv, p. 208.

<sup>2</sup> *Deutsch. Zeitschr. f. Chir.*, 1913, Band cxx, S. 580.

<sup>3</sup> *Annals of Surgery*, 1912, vol. lvi, p. 409.

planting the fresh segment of a vein when we wish to employ it to fill an arterial or venous defect. The segment is isolated and ligated, and then the three sutures, employed by Carrel as stays in his triangular end-to-end anastomosis, are placed at the end of the vein segment before it is divided. When the segment is cut without this preliminary preparation, the walls collapse and curl up, and make it difficult to introduce the stay sutures.

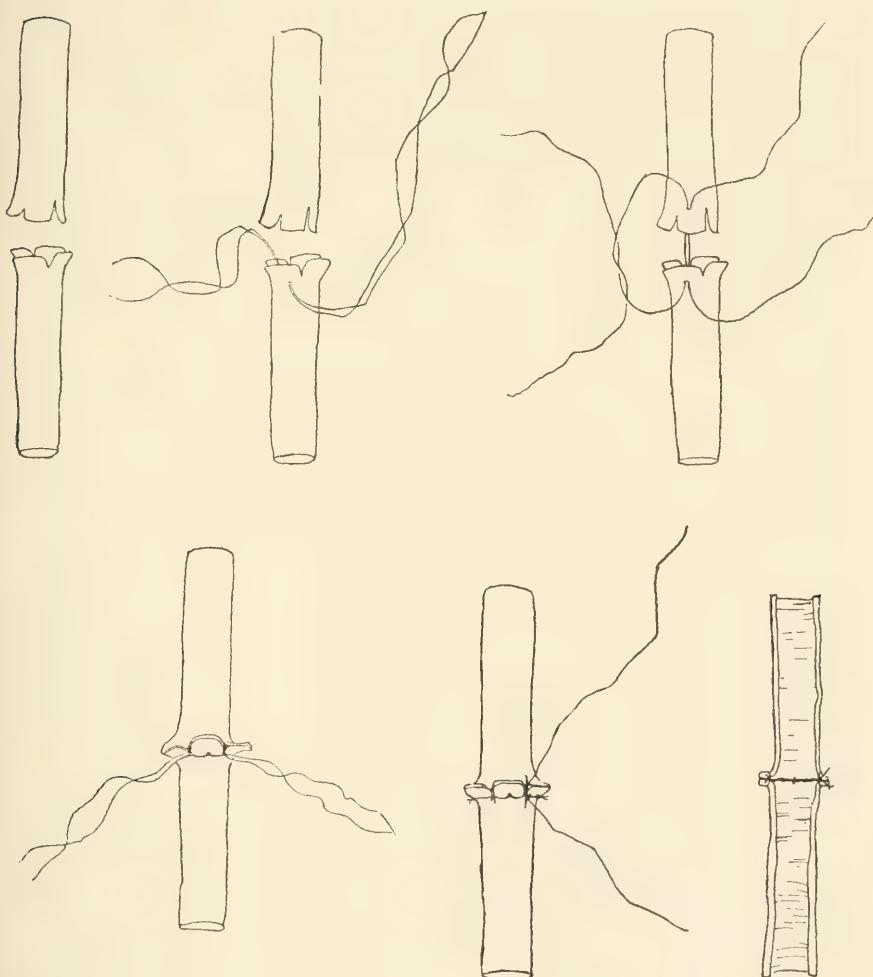


FIG. 36

**Aneurysms.** The chief interest in aneurysms today centre on, first, methods of estimating collateral circulation, so that we may be able to attack the aneurysm directly and remove it, knowing that the

collateral circulation will prevent gangrene; second, how can we apply the technique of vessel suture to the treatment of aneurysms for improving the results over older methods, and, third, the indications for temporary occlusion after the method of Halsted.

I always approach the subject of aneurysm with great trepidation. My personal experience is very small. The experience of Dr. Halsted's clinic of the Johns Hopkins Hospital is perhaps comparatively large in view of Dr. Halsted's interest in, and contributions to, this difficult surgical problem. Yet, when one goes over the cases and reads the literature, one becomes impressed with the fact that many of the problems of diagnosis and treatment are by no means settled. General rules cannot always be applied to special cases. Aneurysms in the same place often require different methods of treatment.

**COLLATERAL CIRCULATION.** Rudolf Matas,<sup>1</sup> of New Orleans, has been most interested in the various methods of testing the efficiency of the collateral circulation as a preliminary to the occlusion of great surgical arteries, and this was the subject of his address before the American Surgical Association as its president in June, 1910. The following are his conclusions:

1. It is possible to compress a vessel to the point of obliterating the pulse, and maintain this pressure for a period of from three to four days before adhesive or obliterative changes occur.

2. All the vessels clamped in this manner stood compression seventy-two hours without apparent microscopic change in the intima; some few began to show marked changes in ninety-six hours.

3. There is apparently no reason why, in occluding the great vessels at the root of the neck, chest, and lower abdomen in continuity, these removable bands should not be substituted for the circular ligature which permanently damages the artery, even when carefully applied. Furthermore, the ligature does not permit of the release of the constriction after a few hours or days of observation without certainty of thrombus formation at the seat of the ligation.

4. In view of the preceding statements, it would seem to be logical to utilize the simple method of occlusion as a preliminary test of the efficiency of the collateral circulation in all regions in which the hyperemia test, as previously described, is not applicable. A brief statement of this research was presented at the meeting of the Society of Clinical Surgery last November (1909), at Rochester, Minnesota. Since then, more experimental work has been done, and a careful histological study of the specimens removed has also been conducted with the assistance of Dr. Gurd, of the Laboratory of Surgical Pathology of Tulane University.

James E. Thompson,<sup>2</sup> of Galveston, reports on his study of the

<sup>1</sup> *Annals of Surgery*, 1911, vol. liii, p. 1.

<sup>2</sup> *Journal of the American Medical Association*, 1913, vol. lxi, p. 171.

collateral circulation in some cases of spontaneous gangrene of the foot. The object here is to decide the question when and where to amputate. He concludes; "Avoid amputation if possible, but, if it is inevitable, amputate high, that is, through the lower third of the thigh." I cannot agree with Thompson. I have gone into this question in great detail in the previous numbers of PROGRESSIVE MEDICINE, and, from my own experience and studies of the literature, I have come to the conclusion that in many cases of gangrene of the toes and the foot, and even extending to the lower portion of the leg, amputation below the knee has often proved successful. The object of this lower amputation is the better stump for the artificial limb. If these cases are seen early, and studied carefully, there is no added danger from performing the low amputation where a secondary, higher amputation may become necessary.

E. J. Ney<sup>1</sup> brings out a very important point, and that is: When shall the accompanying veins be ligated in addition to ligation of the artery. He is of the opinion, from experiments on animals and clinical investigation, that in some cases this accompanying ligation of the vein improves collateral circulation. It is known as von Oppel's method. One can estimate this by digital compression of the vein. If this produces hyperemia of the limb, ligation is indicated. I have had no experience with this.

**LIGATION OF ARTERIES.** This is one of the oldest methods of treating aneurysms, and there is nothing specially new in the technique.

The indications for ligation are best discussed under the special forms of aneurysm.

**PARTIAL OCCLUSION OF ARTERIES.** William S. Halsted has contributed more to this subject than any other surgeon. His experience is not only clinical, but based upon a very large number of experiments on animals. His last contribution,<sup>2</sup> read before the American Surgical Association, considers partial occlusion of the thoracic and abdominal aorta in which he employed bands of fresh aorta and fascia lata. Previous to this he had used aluminum bands. He reports his clinical experience and experimental results. Previous to this, William S. Gatch,<sup>3</sup> from Dr. Halsted's clinic, had reported on the treatment of an aneurysm of the abdominal aorta by partial occlusion with a metallic band and its effect upon the secretion of the kidneys. Halsted<sup>4</sup> also reports a cure of an iliofemoral aneurysm by the application of an aluminum band. In this paper there is also discussed the effect of ligation of the common iliac artery on the circulation and function of the lower extremity. Rudolph Matas and Allen<sup>5</sup> report their experience

<sup>1</sup> Centralbl. f. Chir., 1911, S. 572.

<sup>2</sup> Annals of Surgery, 1913, vol. lviii, p. 183. <sup>3</sup> Ibid., 1911, vol. liv, p. 30.

<sup>4</sup> Johns Hopkins Hospital Bulletin, July, 1912, vol. xxiii, p. 191.

<sup>5</sup> Journal of the American Medical Association, 1911, vol. lvi, p. 233.

with partial occlusion of large arteries by removable metallic bands in order to test the efficiency of the collateral circulation before further operative treatment.

**VESSEL SUTURE FOR ANEURYSMS.** Undoubtedly the ideal operation for an aneurysm is the excision of the sac with restoration of the arterial lumen by vessel suture or transplantation. In many cases, this is not possible. In arteriovenous aneurysms, vessel suture can more frequently be done than in arterial. Omi<sup>1</sup> reports his experience with circular suture for aneurysm of the arterial type, and gives a very good résumé of the literature. Murphy, of Chicago, was the first to perform this in 1896 in an arteriovenous aneurysm in Scarpa's triangle. The entire question, however, of the employment of vessel suture in the treatment of aneurysms is brought up to date by Tscheriachowski<sup>2</sup> in a monograph in which he goes over the entire subject of vessel suture and gives an abstract of all the cases in the literature. Space forbids a discussion of this splendid article. Undoubtedly, the field of vessel suture for aneurysm will be increased when we learn how to successfully substitute long transplants. So far we have accomplished successfully only short transplants. The majority of cases of suture have been for arteriovenous aneurysm.

**ANEURYSMORRHAPHY.** The different methods of this type of treatment, known as the Matas operations, have been previously discussed.<sup>3</sup> McMullen and Stanton<sup>4</sup> report aneurysms of the carotid artery successfully treated by the Matas method. George T. Vaughan<sup>5</sup> reports two cases. In one, the aneurysm was situated in the left iliofemoral artery; but here, in addition to the obliterating method of Matas, the external iliac artery was ligated, so the result must be looked upon as due to ligature. Peripheral pulsation was not observed until fifteen days after the operation. The patient died three months later of heart disease, and the autopsy demonstrated no recurrence of the aneurysm. The second case was a popliteal aneurysm, and the method employed, the reconstructive. Feeble pulsation could be felt in the artery in the wound below the sac after the sac had been sutured, but none in the peripheral artery at the ankle. This seemed to be present twenty-four hours after operation, but was absent after forty-eight hours, and did not return in the arteries about the ankle. The patient, however, made a good recovery. We have every evidence, therefore, that the reconstruction method really ended in obliteration. This, of course, is one of the dangers of the Matas operation. We can never be sure that complete thrombosis of the reconstructed canal may not take place.

<sup>1</sup> Deutsch. Zeitschr. f. Chir., 1911, Band ex, S. 443.

<sup>2</sup> Ibid., 1913, Band cxxiii, S. 1.

<sup>3</sup> PROGRESSIVE MEDICINE, December, 1908, p. 146.

<sup>4</sup> Annals of Surgery, 1910, vol. li, p. 76.

<sup>5</sup> Ibid., 1913, vol. lviii, p. 86.

Ford<sup>1</sup> reports an example of a traumatic femoral aneurysm successfully treated by Matas endoaneurysmorrhaphy. The aneurysm developed after a bullet wound. It is interesting to note that, in this case, the patient was seen in the Army Hospital directly after the injury. The profuse primary bleeding had been immediately checked after the injury by a soldier-comrade who had been trained in the application of the tourniquet. The patient was prepared for operation, but when the tourniquet was removed there was no further hemorrhage and pulsation appeared in the posterior artery. The wound healed. A little more than two months later a pulsating tumor was found near the bullet wound in the lower portion of Hunter's canal. The operation was performed under a tourniquet in the shape of a rubber band around the thigh above the aneurysm. This was sacculated and about  $2\frac{1}{2}$  by  $1\frac{1}{2}$  inches in diameter. The walls of this sac were strong, and there was one opening one-quarter of an inch in diameter communicating directly with the femoral artery. Major Ford closed this opening with fine, chromicized catgut passed on a curved needle through all the tissue; the sac beyond the opening was obliterated by suture; then the free portions of the sac were inverted and sutured. After removal of the tourniquet, pulsation returned in the posterior tibial artery. The soldier is well two years after operation. Dr. Matas, after being given the details of the case, came to the conclusion that it was not a sacculated arterial aneurysm, but an arteriovenous varix in which both vessels communicated with each other and had a common opening into a single sac. In this case the single orifice only was closed, but the arterial venous anastomosis was not obliterated, and Dr. Matas was of the opinion that this was not necessary, because the sac, the most dangerous feature of the lesion, was obliterated. As a confirmation of Dr. Matas' view, we have the statement of Major Ford that one month after operation he could still auscultate a bruit in the region of the wound.

**WIRING OF ANEURYSMS.** Finney<sup>2</sup> gives his further experience with the employment of this method for aneurysms otherwise inoperable. H. A. Hare<sup>3</sup> reports his results with this method of treatment, and William C. Lusk<sup>4</sup> gives us a second report on the employment of gold wire and galvanism. Finney, with the aid of Hunner, worked out all the details of this method many years ago. I would recommend to all who propose to follow this method of treatment to carefully read these articles. Success depends upon the knowledge of many details, and the method is not devoid of danger. Finney is of the opinion that it offers enough to justify the procedure in certain cases.

**ANEURYSMS OF SPECIAL ARTERIES.** As a rule, in recent literature the communications deal with special methods, but what we really

<sup>1</sup> Annals of Surgery, 1912, vol. lvi, p. 933.

<sup>2</sup> Ibid., vol. lv, p. 661.

<sup>3</sup> Journal of the American Medical Association, 1912, vol. lviii, p. 1088.

<sup>4</sup> Annals of Surgery, 1912, vol. lv, p. 789.

need now are articles in which there is an investigation of the results of the various forms of treatment of aneurysms in the same locality—subclavian, axillary, brachial, carotid, aortic, iliac, femoral, popliteal. One must read now many articles and pick out of each the aneurysms in which one is interested at that particular moment. For this reason, it is very helpful to have a comprehensive monograph on subclavian aneurysms by Ellsworth Elliot.<sup>1</sup> But for arteries we have no such available paper.

**ARTERIOVENOUS ANEURYSM.** It is quite true that the arteriovenous aneurysm now offers less obstacles to treatment than formerly, due to the technique of arterial suture, but here also we have no comprehensive monograph with a collection of a number of cases in one situation. The cases are in the literature, but scattered.

Perhaps the most complete review of the treatment of arterial aneurysms, arteriovenous aneurysms, arterial and arteriovenous hematomas will be found in French literature by Monod and Vanverts.<sup>2</sup> They have collected the aneurysms of the neck and upper and lower extremities, and have studied the results of the different methods of treatment. I can only mention here that they conclude that for arteriovenous aneurysm the direct attack on the sac with vessel suture gives far better results than ligation of artery and vein. This, of course, is now the well-established treatment. I believe that in these articles one will find the most comprehensive presentation of this subject up to date. They agree with the statement which I have already made that the problems in the surgery of arteries and aneurysms are by no means settled, but that the new technique of vessel suture and transplantation offers the hope of many cures in cases in which heretofore all the older methods have failed.

#### MUSCLE.

Lesions of muscle are subcutaneous, and, although not particularly frequent, they are of additional interest today, because of the bad prognosis in sarcoma situated subcutaneously, or in the muscles themselves. Myositis cannot be differentiated clinically in its early stage from sarcoma. For this reason, if we wish to increase the number of cures of subcutaneous and intermuscular sarcoma, the palpable swelling should be explored. In ossifying myositis, the bone formation may be late developing, and in this period our clinical diagnosis is not helped by the *x*-rays. Syphilitic myositis should be recognized by the positive Wassermann reaction and the rapid disappearance of the lesion under salvarsan, but not infrequently these patients have received iodides

<sup>1</sup> *Annals of Surgery*, 1912, vol. lvi, p. 83.

<sup>2</sup> *Revue de Chir.*, 1911, xxx, Nos. 5 to 12, and xxxi, Nos. 1 to 2; reviewed in *Centralbl. f. Chir.*, 1912, p. 342.

and mercury enough to change the Wassermann reaction, but not sufficient for much effect upon the lesion.

Since 1902, in the December numbers of PROGRESSIVE MEDICINE, I have critically reviewed the literature on the different lesions of muscle (1902, pp. 137, 166, 171; 1903, 178, 182; 1905, p. 245; 1907, p. 215; 1908, p. 167; 1910, p. 220).

**Injuries of Muscles.** Rupture and muscle hernia were fully discussed in PROGRESSIVE MEDICINE for December, 1912.

**Traumatic Paralysis.** This paralysis is due to injuries to nerves, accidental or operative. In their treatment, we must either find the nerve and reunite it, or transplant another nerve into the terminal portion of the injured nerve, or perform some type of muscle transplantation with the view of substituting the function of the new muscle for that of the paralyzed. Theodor Walzberg<sup>1</sup> calls attention to the paralysis of the trapezius in operations in the region of the neck below the parotid. This complication can be avoided, except when the operation is for malignant disease, by exposing and protecting from injury the spinal accessory nerve. He calls attention to the fact that, in some individuals, the nerve is not in its usual place. But, if the surgeon makes a clean, dry dissection, this nerve, whatever its position, will be seen. Dean D. Lewis<sup>2</sup> describes a method of trapezius transplantation for paralysis of the deltoid muscle. Böcker<sup>3</sup> gives his late results of tendon transplantation for paralysis of the quadriceps. I have previously discussed (PROGRESSIVE MEDICINE, December, 1912) Enderlen's treatment of paralysis of the serratus.

**Tubercular Myositis.** Ernst Dausel,<sup>4</sup> in reporting two cases, brings the literature up to date. He divides tubercular myositis into two groups, *primary* and *hematogenic*, and diagnoses primary tuberculosis of the muscle when the lesion is single and the patient shows no other evidence of tuberculosis, but I do not see how he can exclude the hematogenic origin. According to this classification, his two cases were primary, and, in both, the lesion followed trauma. In cases of this kind, before the development of the abscess, there is no way to distinguish primary tubercular myositis from sarcoma, except at the exploratory incision.

We rarely, however, are given the opportunity to see these cases before abscess formation, because the patients delay.<sup>5</sup>

**Chronic Myositis.** The most frequent cause of chronic myositis is prolonged and tight fixation dressings for fractures and joint sprains, the most common situation in the muscles of the forearm. In this

<sup>1</sup> Centralbl. f. Chir., 1913, S. 1041.

<sup>2</sup> Journal of the American Medical Association, 1910, vol. lv, p. 2211.

<sup>3</sup> Archiv f. klin. Chir., 1909, Band xci, S. 241.

<sup>4</sup> Centralbl. f. Chir., 1913, S. 933.

<sup>5</sup> PROGRESSIVE MEDICINE, December, 1908, p. 177, and 1912.

myositis, contractions quickly develop. These were first described by Volkmann forty years ago, and are now well known in the literature as Volkmann's contractures. This type can, and should be, prevented. In the recent state of injuries of joints and fracture, tight fixation dressings should never be employed, nor need the later fixation dressings be sufficiently tight to ever incur the risk of this complication. Yet Volkmann's contracture is not an infrequent occurrence today. To repeat, it is a preventable disease.

Chronic myositis from causes other than the above, without the formation of bone, is very rare. I have already discussed the observation of Biggs,<sup>1</sup> in which a miner, aged twenty-four years, received a contusion on the thigh. In the recent state there were not many symptoms; about ten days later, pain and swelling appeared; upon examination, an irregular, hard mass in the quadriceps was found. The *x*-rays showed no bone formation. At operation, the tumor was due to increased fibrous tissue in the muscle. The lesion might be called myositis fibrosa (see Figs. 51 and 52, loc. cit.). This case differs from myositis ossificans only in the absence of bone formation; from sarcoma in the fact that the muscle mass was harder. It also could be distinguished from sarcoma from the gross appearance and frozen section. At that time I also reported an observation of my own in which the myositis was in the flexor muscles of the forearm. The patient was a baker, aged forty-two years, and had been under treatment for diabetes for two years; I could not obtain a history of trauma, and there had been no recent change in his occupation. The painful swelling had been present five weeks. The patient was referred to me with the diagnosis of sarcoma. The swelling of the forearm was diffuse, the skin was red and edematous, not unlike a rapidly growing sarcoma. The *x*-rays showed no bone formation in the muscle, nor changes in the bones of the forearm. I felt that if it were sarcoma the probabilities in favor of metastasis were great. Amputation only would have removed the disease locally. At the exploration, the new tissue in the muscle was entirely different from a cellular sarcoma; it resembled more scar tissue. The frozen sections were similar to the pictures shown in Biggs' case—myositis fibrosa. The condition was relieved by incision. I have followed this patient for some ten years, and the result confirmed the diagnosis of a non-malignant disease.

Since then, in my personal experience and in the literature, I have seen no similar cases. It must be rare. On the other hand, ossifying myositis is not at all infrequent.

**Volkmann's Contracture.** Emory G. Alexander<sup>2</sup> reports two cases. Both demonstrate the truth of what I have just said.

<sup>1</sup> PROGRESSIVE MEDICINE, December, 1902, p. 167.

<sup>2</sup> Annals of Surgery, 1913, vol. lvii, p. 555.

CASE I. Female child, aged six years. T-fracture of lower end of humerus; the arm was dressed with a small right-angle splint; the bandages were placed so tightly that they had to be loosened on account of pain in a few days, but, in spite of this, the splint was not removed for six weeks; at this time the signs of myositis in the indurated muscle and the beginning contraction of the fingers demonstrated that Volkmann's disease was present.

CASE II. Male, aged ten years, admitted five days after an injury to the elbow-joint. Immediately after the injury the arm was put up in an anterior right-angle splint and firmly bandaged; immediately, the fingers became blue, cold, and numb. The patient suffered intensely from pain, but the dressings were not removed for twelve or eighteen hours. In this case, therefore, we have the history of a tight bandage applied not more than eighteen hours. When the child was examined four days after the dressings had been removed, the forearm and arm were swollen, the forearm cold, of a dusky-blue color, there were numerous blebs beneath the epidermis, and at the bend of the elbow a large superficial ulcer. Six weeks after the injury the signs of Volkmann's contraction began. This case is of especial interest, because it demonstrates that the myositis may develop even when the tight bandage remains on but eighteen hours. We can be quite certain in this case that, in addition to pressure, there must have been great anemia of all the tissues. Alexander was not responsible for the primary treatment in these two cases.

The treatment employed in both cases was a splint with a movable joint at the wrist which allowed gradual extension. The result was an unusually good one. In his article, Alexander gives illustrations of the splint employed. Undoubtedly, for certain cases this non-operative treatment will be successful.

It is my opinion that, if one sees cases of this kind within a few days after the tight dressing had been applied, treatment may prevent the development of the contraction. This treatment should consist of baking the extremity in dry, hot air, and soaking it frequently during the day in hot water. This will increase the circulation. In addition, there should be passive motion, and when the contractions begin to develop, some fixation splints which should be removed daily. The object of this splint is to prevent contraction by producing hyper-extension. I have records of three cases in which I prevented the development of Volkmann's contraction. Of course, one cannot be certain that this condition would have developed. Theoretically, the earlier the treatment is instituted, the quicker and better should be the result.

The monograph by Kroh,<sup>1</sup> from the clinic of Bardenheuer, in Cologne, is, first, a contribution to the anatomy and pathology of the trans-

<sup>1</sup> *Deutsch. Zeitschr. f. Chir.*, 1913, Band cxx, S. 302, 471.

verse striated muscles, then an experimental investigation on ischemic paralysis of muscle and muscle contraction.

He gives us a conception of the lesion from which most practical conclusions for prevention and treatment can be deduced. The ischemic myositis is dependent upon a number of factors. First, interference with the circulation; second, inactivity of the muscle. Perhaps the latter is of the greatest moment, and, as it is the one over which we have the greatest control, knowledge of this factor is of the greatest importance. Interference with the circulation can be brought about by pressure on the great vessels. This may be due directly to the tight dressing, or to hemorrhages about the vessels following contusion. We need not here discuss the theoretical effect on the muscle from exclusion of oxygen and accumulation of carbon dioxide when the circulation is impaired, or the effect of the effusion in the muscle tissue secondary to trauma-hemorrhage, or the effusion secondary to the impaired circulation, or the exact effect of inactivity on the muscle. It is an interesting study in chemistry and cellular pathology. But the practical point is this: We must bear in mind the factors which produce myositis, because, with the knowledge of these factors, we may, to a large extent, prevent at least that extreme myositis which leads to fibrous changes, involvement of nerves, and muscle contraction. After the pathological process of this myositis has reached a certain stage, we cannot hope for much change in the scar tissue, and we can only very moderately improve the deformity and loss of function due to contraction.

The factors in this ischemic myositis are: (1) A trauma, which may or may not produce a fracture. As a matter of fact, a fracture, unless there is a dislocated piece of bone which, by pressure, adds to the interference with the circulation, has nothing to do with the muscle lesion; (2) the dressing. Over the first factor, the trauma, we have no control; over the second, the dressing, we are absolute masters.

We must remember, therefore, that after every injury this type of myositis must be considered as a possible secondary complication. The probabilities are that we can prevent it in most cases, if not in all, first, by never applying a fixation dressing which interferes with circulation; second, by the reduction of the dislocation or fracture, by operation if necessary; third, by improving the circulation.

The means for accomplishing the latter are active hyperemia in hot baths and baking; gentle massage; muscle inactivity should never be allowed; every patient with an injury of this kind should be forced to use the muscles of the injured extremity. This is possible in a properly applied fixation dressing. The muscle activity can be increased by frequent dressings with passive motion and massage and later electricity. In many cases, in the recent state of such injuries, no fixation dressings should be applied. In some cases active treatment to increase

circulation and muscle activity is not as urgent as in others. It is fortunate that ischemic myositis, with its contraction, takes place only in extreme cases, because even today in injuries of this kind, with or without fracture and dislocation, the condition of the muscle and the proper treatment to prevent myositis is rarely considered or employed. It is interesting to note that in the three schemes of the treatment of fractures which have yielded the best results, there is one feature in common—muscle activity. Lucas-Championnière employs no splints, but passive motion and massage; Bardenheuer, with his methods of extension, avoids constricting bandages and allows for muscle activity. Lane, in fixing the fracture by immediate operation, is able to dress the limb with the least constriction. All other methods in which the injured limb is fixed immediately after the trauma in a tight dressing are contra-indicated, there is always the risk of this myositis, and it is good fortune rather than good management that it does not take place more frequently.

The point emphasized by Kroh, that inactivity of this striated muscle is the most important factor in ischemic myositis with the resultant contraction, if appreciated and heeded by the profession throughout the world, will, I am sure, place Volkmann's contraction among the diseases of historical interest only.

Nevertheless, at the present time we are still confronted with demands for the relief of Volkmann's contraction, and we welcome any new method of attack, because in the past many cases have not been helped much by any of the present-known operative or non-operative procedures.

Horwitz,<sup>1</sup> from Bier's clinic in Berlin, reports a new method. The operation was first performed by Klapp. It is an application of the method first employed by v. Mikulicz who resected parts of both bones of the forearm in order to make the length of bone equivalent to the length of the shortened muscle. Klapp felt that if bone was resected at the position of the greatest flexion of the deformity it might give better results. Now, in Volkmann's contraction of the forearm, the point of greatest flexion is at the wrist. Klapp, therefore, resected the first line of carpal bones. According to his illustration, the correction of the deformity is absolute (Figs. 37, 38, and 39), and the patient, who had been unable to use his hand for years, now earns his living as a bookkeeper.

Horwitz emphasizes the importance of preventive treatment as I have just done, and mentions, in addition, a recommendation of Bardenheuer, who calls attention to certain fractures in the region of the elbow-joint, especially the supracondyle of the humerus. In some cases, after reduction, no dressing at all should be applied. In these cases there is marked swelling about the elbow, and the case should be watched care-

<sup>1</sup> Deutsch. Zeitschr. f. Chir., 1913, Band cxxi, S. 531.

fully on a pillow splint. If the primary swelling does not subside rapidly, incisions should be made through the fascia into the muscle to relieve the tension from the effusion. Personally, I have never had to do this, although I have watched a number of cases in which the primary swelling was very marked. When the injured arm is placed on a pillow splint,



FIG. 37



FIG. 38



FIG. 39

is frequently immersed in hot water or baked, given gentle massage and passive motion, and the patient encouraged to move the muscle, the swelling rapidly disappears, and, after ten or twelve days, the proper dressing can be applied. When the dislocation of the fragments is not marked, the reduction is not made at once, but after the swelling has subsided.

Horwitz mentions, among the methods of treatment, the non-operative (extension) and the operative. These consist of elongation of tendons, shortening of bone, incision with separation of the muscles and isolation of the nerves, with excision of as much scar tissue as possible. But, as he states, many cases have resisted all methods of treatment. The case he reports is one of them, although, as a matter of fact, it had resisted only the non-operative methods of treatment.

Göbell,<sup>1</sup> of Kiel, reports a case in which, for the relief of the ischemic contraction of the muscles of the forearm, free transplantation of striated muscle was done. This is a new procedure. Lexer, Wrede, and Kocher, senior, have expressed the opinion that free transplantation of striated muscle was not possible. Yet, in 1909, Jores successfully reported free transplantation on rabbits.

After transplanting a piece of muscle from the thigh into the back of a rabbit, he weakly stimulated the transplant with the faradic current on the principle announced by Marchand and Roux that the nutrition of contractile tissue like muscle can only be properly maintained when its function is kept up even artificially. This confirms the view already mentioned by Kroh, that muscle activity is a very important element of its life, and prevents degenerative processes.

Göbell gives an interesting, short summary of the development of the operative treatment of Volkmann's contracture. In 1896, Mikuliez and Henle resected bone; in 1889, Wood-Anderson elongated the tendons; then came the method of Drehmann, and Bardenheuer's elongation of the muscles by transverse and oblique incision; then Fritz Frank separated the attachments of the flexors and extensors, and displaced them down; in 1903, Bardenheuer and Hildebrand separated the nerves. Kirschner, in 1912, recommended elongation of the muscle by the free transplantation of fascia. Now we come to the method just described by Horwitz and performed by Klapp—excision of the first row of carpi followed by a plastic elongating of the tendons. The most recent method is that of Göbell—transplantation of muscle.

**Ossifying Myositis.** This subject has been most thoroughly reviewed.<sup>2</sup>

The most interesting feature is the differential diagnosis from sarcoma. Both lesions may develop after trauma, immediately or after a free interval. If the myositis is seen early, before bone forms, it cannot be differentiated positively from sarcoma, except at the exploratory incision. In those cases in which the bone formation in the muscle extends to the shaft of the neighboring bones, there may be some difficulty, even in the *x*-rays, in differentiating the lesion from a periosteal osteosarcoma.

<sup>1</sup> Deutsch. Zeitschr. f. Chir., 1913, Band cxxii, S. 318.

<sup>2</sup> PROGRESSIVE MEDICINE, December, 1902, p. 167-172; 1903, p. 182; 1905, p. 246; 1908, p. 173; 1910, p. 220.

William B. Coley,<sup>1</sup> in reporting a number of interesting cases, considers especially the difficulties of the diagnosis from sarcoma, and also reports a case in which it developed six years later. This, as far as I know, is a unique case.

Coley's Case I. Boy, aged seventeen years; contusion of thigh; the swelling appeared in twenty-four hours; in three days stiffness of the quadriceps muscle; the swelling, at first soft, became harder. At this time, a clinical diagnosis of sarcoma was made, and amputation advised. The patient was seen later by Dr. Coley, five months after the injury. The *x-ray* now (Fig. 40) shows a definite bony growth resting upon the femur without any change in this bone. It is my opinion that sarcoma could be excluded from this *x-ray* made five months after the injury. It would have been very interesting, however, to have had an *x-ray* immediately after the injury. In my experience, a sarcoma of five months' duration developing after an injury offers not much hope of a cure. The lesion must be explored within a few days, or weeks, after the first appearance of the swelling, when the sarcoma must be differentiated from the myositis. Dr. Coley, in this case, also made the diagnosis of myositis, but explored and took a piece for diagnosis. The histological appearance is shown in Fig. 41 and could not be mistaken for sarcoma. An *x-ray* was taken of this patient almost six years later. Not much change had taken place in the bony growth. The patient writes that it gives him very little trouble. This result demonstrates that operation is not always indicated for the ossifying myositis. In my experience, the chief indication for operation is in the early stage of the swelling when the *x-ray* does not allow a differential diagnosis, and this operation should be exploratory only, unless sarcoma is found.

In fact, in ossifying myositis, except in the very late, quiescent stage, partial excision is followed by recurrence, and the recurrent lesion is often more troublesome than the primary.

Coley's Case II. Female, aged twenty-six years; contusion of the lower thigh seven years ago. The immediate swelling of the contusion subsided, and nothing abnormal was noticed for two years. Then she observed swelling above the knee. An examination at this time revealed a palpable bony enlargement, and the *x-ray* showed an exostosis. The patient saw Dr. Coley in May, 1909, five years after the beginning of the trouble. A few months previous to this one surgeon had diagnosed subperiosteal sarcoma, and another fibrosarcoma. Both advised hip-joint amputation. The *x-ray* taken by Dr. Coley at this time (Fig. 32) showed an irregular periosteal growth about the lower end of the femur. In this case it is my opinion that it would be difficult to differentiate a periosteal osteosarcoma. Dr. Coley explored and found an ossifying lesion attached to the femur. The microscopic

<sup>1</sup> Annals of Surgery, 1913, vol. lvii, p. 305.

sections showed no evidence of sarcoma. In January, 1912, about two years and eight months later, the patient consulted Dr. Coley again.



FIG. 40.—Myositis ossificans, 1907. (Case I.)

FIG. 41.—5 $\frac{3}{4}$  years later, December, 1912. (Case I.)

During this interval there has been a perceptible enlargement of the bony growth, and the *x*-ray (Fig. 43) showed distinct changes in the

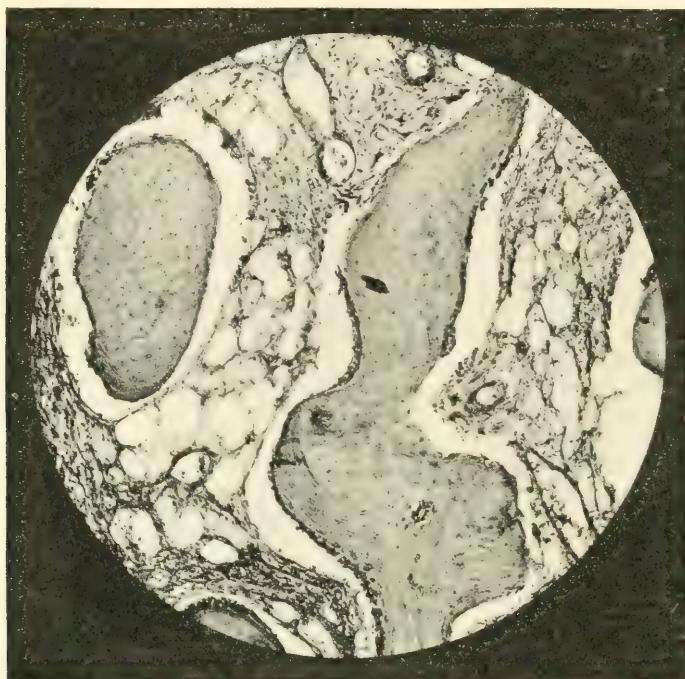


FIG. 42.—Myositis ossificans, 1907. (Case I.)

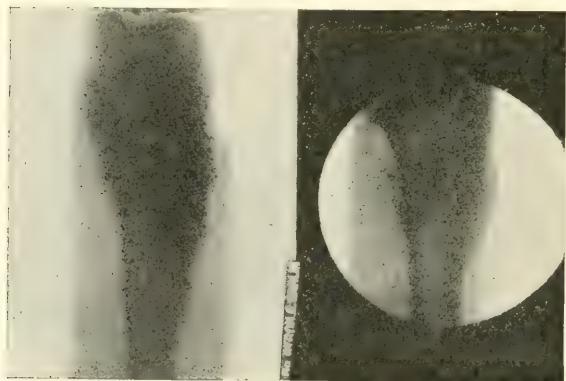


FIG. 43.—Interval, 2 years 2 months—May, 1909—July, 1911. (Case II.)

shaft of the femur beneath the periosteal growth, not present in the previous *x*-ray. At the exploration there was no gross evidence of sarcoma, nor did the microscope reveal anything suspicious of it. The

case, however, progressed, the patient began to suffer pain, and in March, three months later, the *x-ray* (Fig. 44) showed changes not only in the periosteal bony growth, but more in the shaft of the femur. Now, at the exploratory incision by Dr. Coley, soft, grumous material was found. The diagnosis by Dr. Ewing, the pathologist, was giant-cell sarcoma. After preliminary treatment with the toxins, the leg was amputated in April, 1912, about three years after Dr. Coley's first incision. The gross specimen is illustrated in Fig. 20, a longitudinal section through the lower end of the femur. It appears to me that the previous periosteal bony growth and the shaft of the bone are largely replaced by a whitish tissue which, under the microscope (Fig. 46), does not look to me like a giant-cell sarcoma, but a very malignant mixed-cell sarcoma containing giant cells. The patient died about eight months after amputation with symptoms of metastasis.

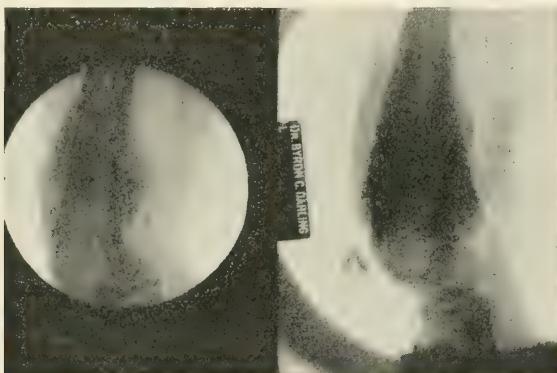


FIG. 44.—Interval, 2 years 8 months—May, 1909–January, 1912. (Case II.)

In this case there seems to be no doubt that the first lesion was benign—either an ossifying myositis or periostitis secondary to trauma, and that, later, a sarcoma developed in this benign growth. I have followed about ten cases of ossifying myositis and have as yet never observed a sarcoma to develop. As far as I know, this is the first case reported. Dr. Coley does not comment upon its rarity.

This paper of Dr. Coley is one of the most interesting in American literature, and he appends all the most important references to the literature on the subject.

**Muscle Atrophy.** Grossmann<sup>1</sup> confirms the statement of Schiff that inactivity alone may lead to atrophy of muscle, and this again bears out what has been said here in the review of Kroh's work (page 255). I mention this here again, because I am constantly impressed with the fact that in the treatment of many diseases, both general and local,

<sup>1</sup> Centralbl. f. Chir., 1912, S. 621.

we overlook the importance of maintaining muscle tone through some means. Perhaps this explains the good results of osteopathy in certain cases.

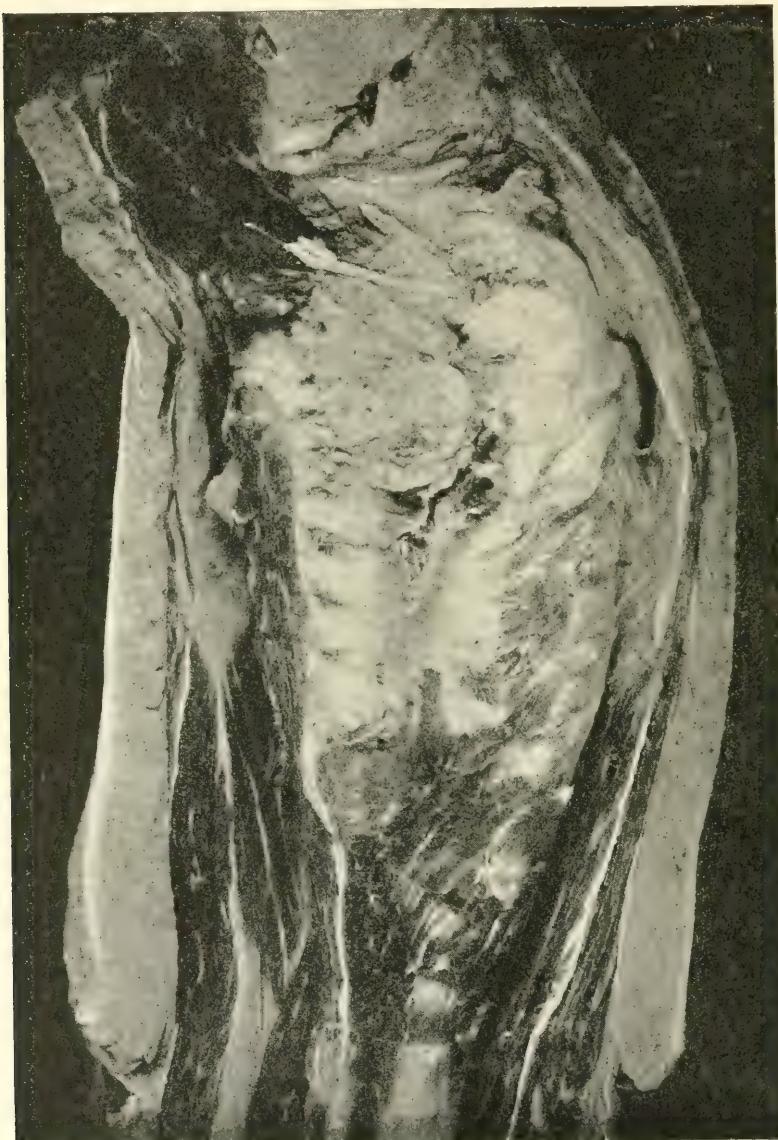


FIG. 45.—Longitudinal section showing central ivory-like bone, March, 1912. (Case II.)

**Muscular Hypertrophy.** This is a very rare lesion. The common situation is in the tongue. When we have an hypertrophy of a single

muscle we must consider myositis, intermuscular hemangioma, and intermuscular sarcoma. True hypertrophy of single muscles, except in the tongue, is so rare that this diagnosis should never be made, except after exploratory incision and microscopic examination of the piece excised. Welzel<sup>1</sup> gives a very good résumé on muscular macroglossia. He is of the opinion that, among 114 cases collected from the literature, in 32 the hypertrophy was of the muscle; in 23 of these the clinical diagnosis was confirmed by microscopic examination. The lesion is always congenital, or appears so early in life that it may be looked upon as due to congenital causes. There are three types—pure muscular,

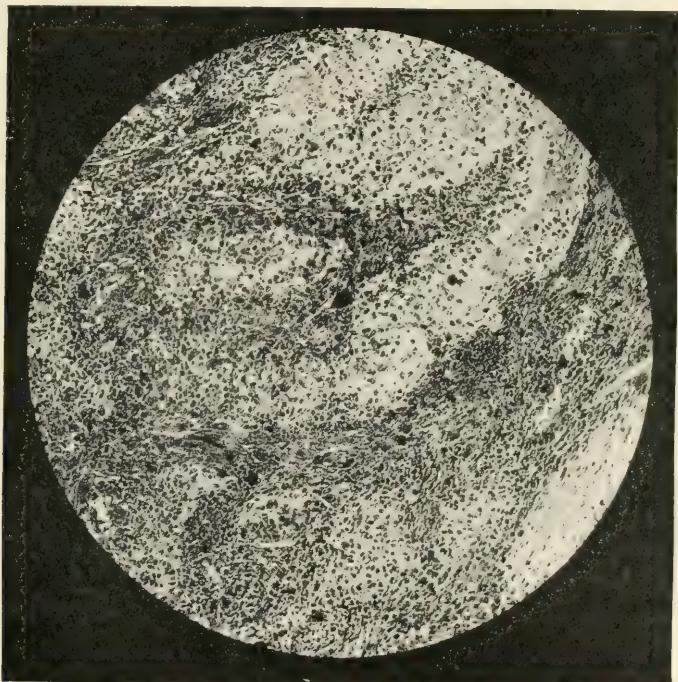


FIG. 46.—Giant-celled sarcoma, March, 1912. (Case II.)

muscular and connective-tissue, and hypertrophy of all the tissues. In a few cases, the individual is otherwise normal, but in the majority of the cases there are other defects: idiocy, cretinism, epilepsy; hypertrophies of other parts of the body, such as the face, jaw, gum, ear, and extremities. The hypertrophy of the tongue may be one-sided. The exact etiological factor is unknown.

The most common cause of enlargement of the tongue, of course, is a lymphatic hypertrophy.

<sup>1</sup> Beitr. z. klin. Chir., 1910, vol. lxvii, p. 570.

**Tumors of Muscle.** In my previous reviews<sup>1</sup> I have shown that the most common intermuscular tumor is a hemangioma. Sante Solieri,<sup>2</sup> in reporting a case, reviews the literature. His most interesting statement is a record of the wide distribution of the cases he has collected, which is as follows: masseter muscle, 2 cases; internal rectus at the eye, 1 case; in the neck, the trapezius, 6 cases; the deep muscles of the neck, 2 cases; none in the sternocleidomastoid; on the chest: 3 cases in the pectoralis major, 4 in the intercostal, 1 case in the serratus magnus; in the abdomen: 3 cases in the rectus, and one in the lateral abdominal muscles. It is interesting to state here that the most common tumor of the rectus muscle is a fibro-spindle-cell tumor, often called dermoid, and frequently observed in women after pregnancy. The 14 cases of the upper extremity were distributed as follows: deltoid 1, triceps 4, flexors of the forearm 7, pronator quadriceps 1, supinator longus 1, muscles of the thenar eminence of the thumb 1. The 27 cases of the lower extremity were distributed as follows: gluteus maximus and medius each, 1 case; rectus femoris, 11 cases; rectus medialis, 1; muscles of the calf, 7; of the foot, 2.

The most common situations, therefore, are the trapezius, the flexor muscles of the forearm, the quadriceps femoris, and the muscles of the calf of the leg. In my own experience, the cheek and the masseter muscle have been more frequently involved than in this table.

In the beginning, intermuscular hemangioma may produce no local symptoms. The compressibility and change in size may be so slight that they cannot be made out because of their deep situation, at least they have been overlooked in many cases. The secondary symptoms, contraction due to fibrous change in the muscle, may be the first symptom noted by the patient and the only one found at the examination. In cases of contraction of the extremities, one should always look for this possibility. I have seen patients who had been treated for flat-foot with tenotomy of the tendo Achillis, or of the tendons behind the knee-joint, and the muscular lesion of the knee-joint was overlooked.

As a rule, the compressibility and the change in size in the region of the swelling allow a pretty positive diagnosis. In some cases, we are helped by the presence of visible varicose veins. In older cases, the compressibility and change in size may be extreme, due to the increase in the connective tissue, and we then palpate a hard, infiltrating mass. Sarcoma, as a rule, can be excluded from the long duration of the disease, but, in these cases, at the exploratory incision, the gross appearance, and even the frozen section of a piece excised, may be misleading, and an incorrect diagnosis of sarcoma made. I have reported such cases in *PROGRESSIVE MEDICINE*.<sup>3</sup>

<sup>1</sup> *PROGRESSIVE MEDICINE*, December, 1903, p. 184; 1905, p. 242; 1907, p. 215; 1908, p. 177.

<sup>2</sup> *Zeitschr. f. orthop. Chir.*, 1912, Band xxx, S. 417.

<sup>3</sup> December, 1903, p. 154, and 1907, p. 206.

### TENDONS.

This subject was so fully reviewed last year that I find little to add from the recent literature.

**Ossification of Tendons.** S. F. A. Charles<sup>1</sup> reports a case of ossification in the fascia or aponeurosis of the external oblique muscle. The patient, a laborer had, six months previously, sustained a contusion here with fracture of the pelvis, and then, later, developed a hard tumor. I think we might question the diagnosis of ossification of tendon, and perhaps place this case with myositis ossificans.

**Stenosing Fibrous Tenosynovitis.** Peterson<sup>2</sup> adds two new cases to this rare tendon lesion first described by De Quervain, in 1895. He is of the opinion that it is of traumatic origin, and must not be confused with tenosynovitis crepitans. In the early stage, perhaps, the secondary deformity and stiffness may be prevented by non-operative treatment —baking, passive motion, and Bier's hyperemia, but in the later stages the best results are obtained from dividing the stenosing fascia with or without tenotomy and a plastic.

**Chronic Infective Tenosynovitis.** W. W. Grant<sup>3</sup> reports a very interesting observation. The patient was a colored man, aged fifty-three years, a hard-working janitor. For five and one-half years he complained of pain and stiffness in the fingers extending to the palm of the hand and flexor surface of the forearm. It had been diagnosed as rheumatism. Some two and one-half months before operation, the pain and swelling increased and fever was noted. At the examination by Dr. Grant, the fingers were partially flexed, and there was practically no ability to move them. The palmar and flexor surfaces of the forearm and the thumb were swollen. The annular ligament formed a constriction between the swellings of the palm and the forearm. The swellings on pressure were soft and doughy, and palpation elicited fluctuation between the swellings. The extensor muscles were not involved. Wassermann reaction was negative. At the operation, an incision was made over the flexor surface of the forearm down on the palm of the hand. There were no signs of inflammation between the fascia and the tendon sheath, but the latter were matted together by an inflammatory exudate, and the veins were dilated. The tendon sheaths were thickened, and in the sheath about the tendons there was thick, grumous, odorless material resembling cornmeal gruel; here and there were cysts containing the same material. Some of the tendons seemed softened. Each tendon sheath was opened, the material washed and wiped out, and some of the material and thickened sheaths removed. The carpal

<sup>1</sup> British Medical Journal, April 27, 1912.

<sup>2</sup> Centralbl. f. Chir., 1913, p. 1053.

<sup>3</sup> Surgery, Gynecology, and Obstetrics, 1912, vol. xv, p. 43.

joints did not seem involved. The annular ligament which had been divided was sutured, and the wound closed with drainage. After the operation there was fever for five days, and a slight discharge of pus. The wound healed slowly by granulation, but there was some discharge for at least two months. The postoperative treatment was Bier's hyperemia, passive motion, and massage. Good function was restored in about three months. There was still some slight flexion deformity in the index and little finger and in the thumb. The microscopic examination showed the granulation tissue in which the small lymphoid cells predominated. No tubercles or giant cells and no tubercle bacilli were found.

Here we have a chronic tenosynovitis of the flexors of the hand and fingers, with perhaps a secondary infection not investigated bacteriologically, with an excellent result from operative treatment.

**Tumors of Tendons.** Frank S. Mathews<sup>1</sup> reports a tumor on the distal phalanx of the first finger. It was the size of a hazelnut and hard. The tumor was adherent to the tendon sheath. Microscopically, it was composed chiefly of giant cells.

Mathews apparently prefers the term myeloma. I shall discuss his article on myeloma of the long pipe bones later. The term is misleading enough even when applied to bone tumors, but more so when applied to tendon-sheath tumors. These solid tendon-sheath tumors are very common. They are chiefly composed of fibro-spindle-cell tissue, and often contain giant cells.<sup>2</sup> These tumors suggest trauma as the etiological factor. Sarcoma is a very rare secondary development. The interesting subject of finger tumors has been considered in detail.<sup>3</sup>

**Tendon Transplantation.** The chief literature, both recent and past, deals with this operative feature. James Warren Sever,<sup>4</sup> of Boston, gives a very good résumé of tendon transplantation and silk inserts, with the following conclusions:

1. Tendon transplantation *per se* is at times useful.
2. Tendons lengthened or reinforced with silk are better in that they are not only stronger, but also can be used to greater mechanical advantage.
3. Silk or linen thread is an excellent material to use to lengthen tendons in suitable cases.
4. The growth of new tissue will penetrate and permeate the silk only slightly (in some cases not at all), and does not absorb it.
5. When the peritendineum and tendon sheath have been removed, some foreign body is essential for regeneration, to serve as a director for the new growth.

<sup>1</sup> Annals of Surgery, 1911, vol. liii, p. 847.

<sup>2</sup> PROGRESSIVE MEDICINE, December, 1903, p. 172; 1909, p. 206.

<sup>3</sup> Ibid., December, 1905, p. 262; 1907, p. 210; 1909, p. 206.

<sup>4</sup> Journal of the American Medical Association, 1912, vol. lviii, p. 1432.

6. With the sheath and the peritendineum present and sutured, no foreign body need be inserted. In this case, the new growth is true tendon tissue.

7. Without the presence of the sheath and the peritendineum, no true tendon tissue can be regenerated. Such tissue is merely fibrous tissue, lacking elasticity and subject to stretching.

8. The new "tendons" are apt to be larger and stronger than the resected ones, especially when silk has been used to replace the resected portion.

9. Provided the sheath and peritendineum are preserved and function allowed early, adhesions may not occur. Without the sheath, adhesions may and do occur much more frequently.

Lexer<sup>1</sup> gives a very clear summary of his experimental and clinical experience with the free transplantation of tendons. In the first place, the wound, if possible, should be made in such a way that when replaced and sutured, it does not cover the transplanted and sutured tendon. This can be accomplished, except on the fingers, by flaps. On the fingers, small horizontal incisions corresponding to the folds should be made and then the skin tunneled from incision to incision. If the transplanted tendon is to replace the tendon of a muscle in which we desire function, there should be early passive motion and massage and active motion in the postoperative treatment. This prevents adhesions. When the transplanted tendon is for the support of a joint, there should be fixation for some weeks. The most difficult cases are those in which the tendons of the hands have been destroyed by phlegmons. Here we must first overcome the skin contraction by plastic operations, restore joint function by resection, and interposition of soft parts; then only is the tendon defect replaced by free transplantation. If the tendon is to be fixed to bone, the periosteum must be stripped back and the end of the transplant sutured between the periosteum and the bone. Lexer uses auto- and homotransplantation of tendons, and also transplants fascia. Kirschner,<sup>2</sup> in the discussion, calls attention to the difficulty of getting tendon material for autotransplants. For this reason he prefers fascia, and calls attention to the fact that the fascia lata gives us all the material we may desire.

Schepelmann,<sup>3</sup> from Wullstein's clinic in Halle, reports on his animal experiments and clinical observations on the transplantation of a vein to bridge the defect in a tendon. It is apparently just as successful as tendon or fascia. The lumen of the vein later becomes filled with connective tissue. In animals, he employed both the saphenous and the femoral; in the human being, we have many external sub-

<sup>1</sup> Centralbl. f. Chir., 1912, Supplement, p. 10; Archiv f. klin. Chir., 1912, Band, xcvi, S. 818.

<sup>2</sup> Ibid.

<sup>3</sup> Deutsch. Zeitschr. f. Chir., 1912, Band cxv, S. 459.

cutaneous veins which could be employed. In view of the smooth external surface of the vein, it may be found that this transplant is best when we wish to fill in defects in the tendons of the fingers. It would be quite possible to make a combination of transplants of silk and vein. The silk would be passed through the vein, fixed to the tendon stumps at each end and the vein pulled over the tendon stumps and sutured.

**Fascia** (Free Transplantation). I discussed this last year, especially the comprehensive articles of Kirschner and John Staige Davis.

Lucas<sup>1</sup> gives a most interesting report of his clinical results. There are forty-one cases of transplantation of fascia to replace dural defects from various causes—all with good results; two for the replacement of the posterior wall of the urinary bladder, one for the anterior wall; this latter was his only failure. He has employed it to strengthen the suture after resection of the intestine and stomach. This seems unnecessary. He has employed it to fill a defect of the trachea, in hernia, extrophy of the bladder, and to replace defects in the peritoneum. There is practically, therefore, only one failure, and that he ascribes to faulty technique. He has observed also in a few cases on the thigh a slight hernia of the muscle, which, however, gave rise to no discomforts.

Denk<sup>2</sup> gives the entire experience of von Eiselsberg's clinic in Vienna as follows: dural defects, 19; in mobilized joints to prevent ankylosis, 2; ventral herniæ, once to strengthen suture after resection of the rectum, and 3 urethral defects. The results were excellent. He has observed one muscle hernia without symptoms. Sometimes the patients complained of numbness or formication in the scar on the thigh.

In aseptic wounds with good circulation at the base and proper adaptation, the free fascia always heals. Drainage should not be employed. In less aseptic wounds and in the presence of drainage, the fascial transplant *may* heal.

Warschauer,<sup>3</sup> of Hanover, gives his clinical experience with a number of cases and confirms the successful results already reported.

These three articles also cover the literature up to date.

Guleke,<sup>4</sup> from Madelung's clinic in Strassburg, has invented an instrument (Fig. 47) to aid in transplantation. After the fascia is exposed, the clamp is opened to the size of the piece necessary for the defect; the clamp opens easily, but can only be shut by moving the spring handles; the little hooks on the blade engage the fascia lata and hold it tense; the fascia is then cut, the instrument now holds it taut and carries it to the place of transplantation where it is fixed by four sutures; the instrument is then disengaged, and the fixation of the transplant

<sup>1</sup> Archiv f. klin. Chir., 1913, Band c, S. 1129

<sup>2</sup> Ibid., 1912, Band xcix, S. 888.

<sup>3</sup> Deutsch. Zeitschr. f. Chir., 1913, Band cxii, S. 67.

<sup>4</sup> Centralbl. f. Chir., 1913, S. 683.

completed by continuous catgut sutures. The object of this instrument is not only to facilitate handling, but to avoid any unnecessary injury. Apparently, from the previous reports, no difficulty has been found in handling the transplant, but this little instrument may prove to be of value.

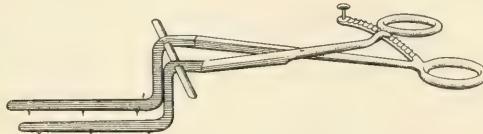


FIG. 47

### SURGERY OF BONES.

**Exostoses.** Single exostoses are usually due to a single trauma, with or without complete fracture, or a continuous trauma such as the rider's bone. The nature of the bone lesion can usually be clearly identified by the *x*-rays. Up to the present time I have been unable to find in the literature, nor have I ever seen, a malignant tumor developed in an exostosis. For this reason, there is no indication to operate on this tumor on the theory of a possible precancerous lesion. One operates only when the exostosis is increasing in size or giving pain from pressure. A cervical rib may be looked upon as a single exostosis with the same indication for treatment. In certain regions very small exostoses may be very painful, especially those connected with the os calcis. These exostoses may also have another etiological factor besides trauma, such as infection, chiefly gonorrhreal. These exostoses are often covered with a bursa, and, in some cases, there may be the rapid formation of a tumor due to the filling of the bursa with fluid, with or without the formation of intrabursal bodies consisting of cartilage or bone. I have reported such a case (PROGRESSIVE MEDICINE, December, 1903, p. 192). In this instance the exostosis was situated on the femur near the lesser trochanter; the history was that of the rapid formation of a tumor in the region of the buttocks, intense pain; the skin covering the tumor showed dilatation of the veins. We had, therefore, the clinical picture of a rapidly growing sarcoma. Only the exploratory incision cleared up the diagnosis and saved the patient from a hip-joint amputation.

**EXOSTOSIS OF THE OS CALCIS.** Sarasin,<sup>1</sup> in his contribution, brings the literature up to 1909, with thirty-three references. The diagnosis is made only by the *x*-ray. He is of the opinion that many of these spur formations on the os calcis are of congenital origin and comes to this conclusion from microscopic examinations. When present in

<sup>1</sup> Deutsch. Zeitschr. f. Chir., 1909, Band cii, S. 399.

old people, he thinks the spur is due to calcification along the fascia insertion. The onset of pain is due to a fracture, or a traumatic or infectious inflammation of the bursa over the spur. Static factors, such as flat-foot, may press the spur into the fascia and produce the painful symptoms. For treatment, Sarasin, whose experience was gained in Garré's clinic in Bonn, prefers, first, non-operative measures. The painful heel is protected by a rubber cushion (Fig. 48). If there is flat-foot, this should be corrected by a proper support.

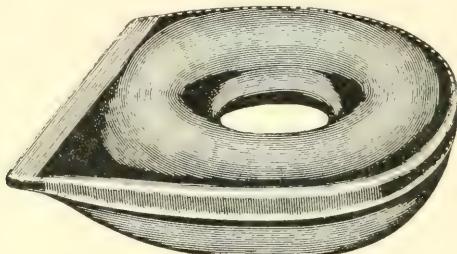


FIG. 48

Piantoli<sup>1</sup> reports two cases associated with polyarthritis of gonorrhreal origin, both in young individuals with flat-foot. The diagnosis was easily made with the *x*-rays. This surgeon prefers excision of the soft parts, periosteum, and the spur formation.

Fischer<sup>2</sup> examined 255 individuals with the *x*-rays; 98 of these were soldiers without symptoms. Spur formations, often bilateral, were found in the os calcis in 26 cases. He apparently believes that they are not of congenital origin, but acquired, due to a single or continuous trauma, especially when associated with flat-foot or infection of the bursa. When conservative treatment does not give relief in the cases associated with pain, he advises operative removal.

Fröhlich<sup>3</sup> examined 50 patients with the *x*-ray, not selected cases. Spurs in the os calcis were found in 20 cases, 10 of these were bilateral; many had no symptoms. He is inclined to the view that the spur alone is not the cause of the pain—there must be a secondary inflammatory reaction of the bursa due to trauma, infection, or gouty deposits. He advises that, before operation, local and general treatment be attempted. Many patients are relieved. When not, removal of the spur and the bursa is indicated.

In patients suffering with painful heels or feet, the first thing to do is to take an *x*-ray. In the presence of any of these spur formations investigate for a general etiological factor, as we now do in all cases of arthritis; attempt to relieve this; employ hyperemia by baking, massage, and relieve any static deformity. Some patients will not be relieved.

<sup>1</sup> Zeitschr. f. orthop. Chir., 1909, Band xxiii, S. 278.

<sup>2</sup> Centralbl. f. Chir., 1910, S. 432.

<sup>3</sup> Ibid., S. 1041.

Then the operative treatment is indicated. My own experience in about six cases has been with those in which local and general measures have failed. They have all been relieved by operation, but, after operation, I kept the patients on crutches for some months and employed hyperemia through baking.

**EXOSTOSES OF THE OLECRANON.** Esau<sup>1</sup> calls our attention to this possibility which I have not seen mentioned before in the literature, nor have I seen it, at least to interpret it, in  $x$ -rays of the elbow-joint. He is of the opinion that it is a fairly common occurrence. In 140 unselected cases, the spur was found with the fluoroscope in seven instances. In most of these, it could be palpated at the end of the olecranon. The more common appearance is shown in (Fig. 49). He

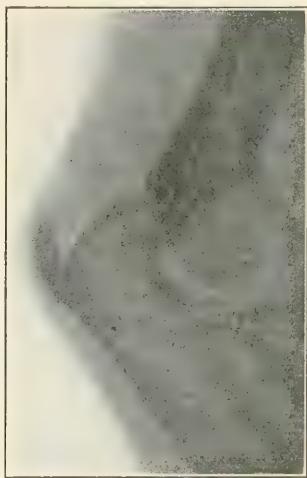


FIG. 49

is of the opinion that this spur formation is a defect in the formation of the skeleton and has no pathological significance. It grows larger as the patient gets older, and for this reason is more often seen in individuals over thirty. It is important to bear this possible spur formation in mind when interpreting  $x$ -rays of the elbow-joint. In fractures, it might be looked upon as a displaced fragment. In contusions, it might be considered a possible fracture. The spur formation rarely, if ever, gives symptoms.

**MULTIPLE EXOSTOSES.** The literature on this is very extensive. Boggs<sup>2</sup> reports a most interesting observation with the following diagnosis: multiple congenital osteochondromas with degeneration of the cranial nerve and muscular dystrophy. The illustrations and their legends are reproduced here.

<sup>1</sup> Deutsch. Zeitschr. f. Chir., 1912, Band cxvii, S. 390.

<sup>2</sup> Bull. of the Johns Hopkins Hospital, July, 1913, vol. xxiv, p. 210.

FIG. 50



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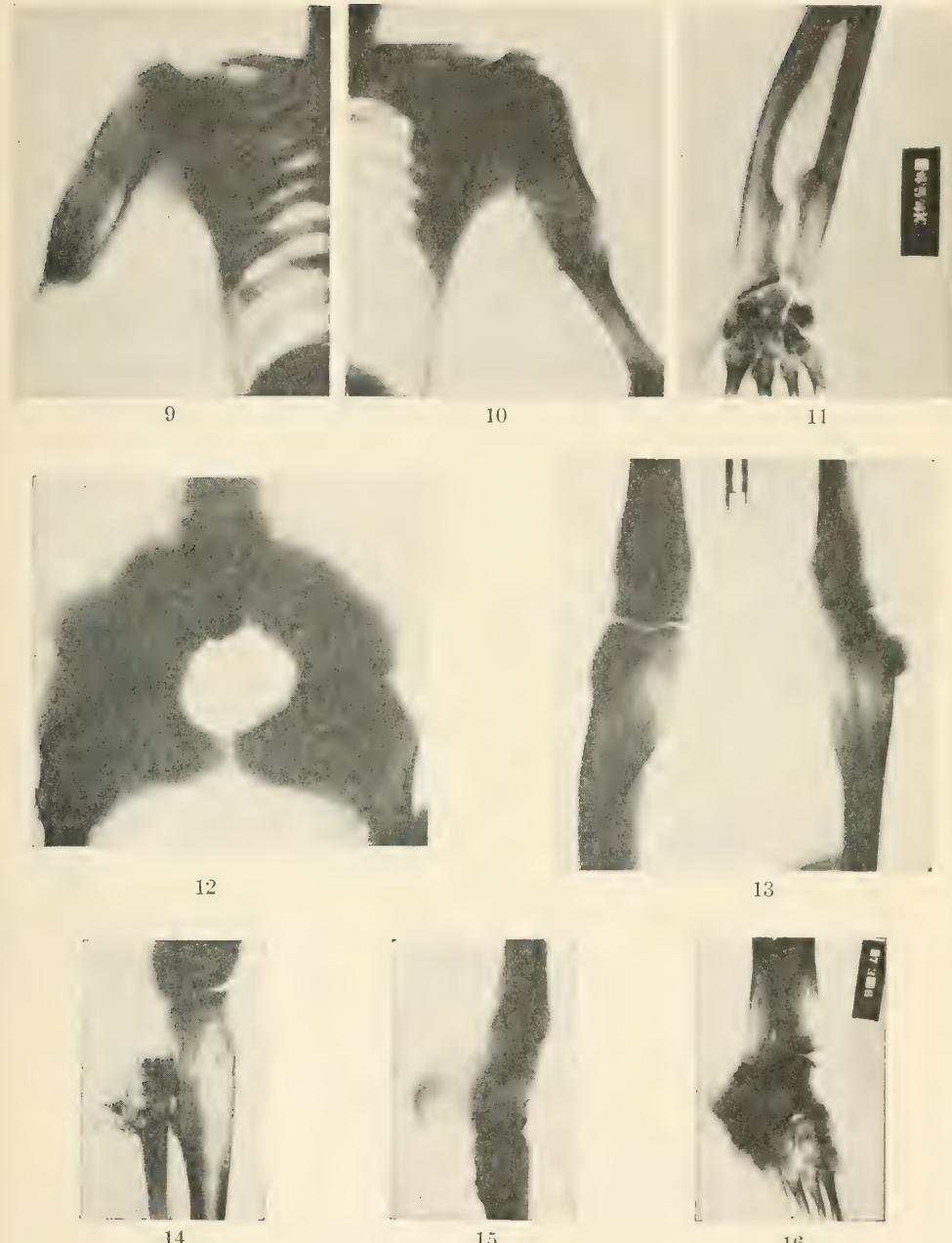


7



8

FIG. 51



1, 2, 3. Photographs showing distribution of tumors.

4, 5, 6. Attitudes in rising from floor (dystrophic climbing).

7. Section of excised muscle showing atrophy.

8. Skull. Normal sella turcica.

9 to 16. Radiogram of skeleton.

11. Characteristic bowing of overgrown radius.

12. Large mass in the pelvic strait.

14. Tumors on left fibula showing cystic changes.

The case is unique in the presence of cranial-nerve paralysis. No microscopic studies were made of the bone lesion. You will note in the *x*-rays (Figs. 50 and 51), besides the exostoses, which are composed quite largely of bone and are situated both on diaphyses and epiphyses, that there is bending of bone, the radius, and the neck of the femur. The shadows of the marrow cavity also suggest either cartilage or cyst formation, humerus, and tibia.

Flinker<sup>1</sup> describes a case in a male, aged forty-two years; no hereditary disease could be ascertained; at three years of age, the previously healthy child was confined to bed for one year with pains in the bones, and the present condition gradually developed. The patient is a dwarf; the chief shortening is in the bones of the extremities, and here most marked in the forearm and leg. The length of the body is not much shorter than normal. The patient has a goitre. The *x*-rays show bending and enlargement of the epiphyses suggestive of previous rickets in addition to multiple exostoses. Flinker, from his study of the cases in the literature, is of the opinion that in at least 50 per cent. of these cases there is evidence of rickets, and that rickets, multiple exostoses, giantism, dwarfism, and osteomalacia may all have the same etiological factor in some change in the secretion of the ductless glands, especially the thyroid.

Gottstein's<sup>2</sup> observation shows how difficult it is to explain the relation between multiple exostosis and goitre. In his case, the multiple exostoses were accidental findings. The patient, aged thirty-three years, was admitted to the hospital with a perforated gastric ulcer, and during convalescence the exostoses were found. The patient also had symptoms of exophthalmic goitre. It was then found that his father suffered from multiple exostoses without further symptoms. Gottstein then calls attention to Ritter's observation in which all members of his patient's family had exostoses except one who suffered from exophthalmic goitre.

We have long known the frequency of multiple exostoses in different members of the same family. Dr. Dunlop, in Washington, sent me *x*-rays of a father and three children. All showed multiple exostoses; there were no other symptoms, no history or evidence of rickets, no goitres.

Curtillet<sup>3</sup> refers to another possible etiological factor which appears to be a common one among French observers, that is, hereditary tuberculosis. I have not seen this mentioned before in the literature. He observed a mother, two daughters, and one son with multiple exostoses. The mother was tubercular. In the children the exostoses in infancy gave no symptoms, but later on in life, after the ordinary infectious diseases of childhood and at puberty, there was noticed enlargement associated with pain and fever. The growth in the exostoses with

<sup>1</sup> Zeitschr. f. orthop. Chir., 1909, Band xxiv, S. 567.

<sup>2</sup> Centralbl. f. Chir., 1911, S. 119.

<sup>3</sup> Ibid., 1912, S. 886.

the painful symptoms continued after the infectious disease had subsided, until the children developed marked deformities of the skeleton with pressure symptoms due to the involvement of nerve trunks.

**Multiple Osteomas and Sarcoma.** Until recently, I have never met in the literature with such an observation. David M. Greig<sup>1</sup> reports a case in a woman, aged eighty-four years, who had suffered with multiple osteomas of possible congenital origin on the face and skull for many years; she had then recently developed a sarcoma over the sternum. But from the review<sup>2</sup> there is no evidence that this sarcoma developed from an original osteoma. He refers to a case reported by Bickersteth,<sup>3</sup> who observed a similar case of multiple tumors on the face and sarcoma of the tibia.

As a matter of observation in multiple osteoma, the bones of the face and skull are least frequently involved, and in these two cases we have no evidence of osteoma on the other bones of the skeleton. It would seem strange that now and then a patient with multiple osteoma should not develop sarcoma, but as yet we have no positive case of the development of sarcoma in one of the multiple osteochondromas or exostoses of the type under consideration. I have observed a patient suffering with three cartilage tumors of the ribs develop sarcoma in one of them.

**Benign Bone Tumors.** Except for exostoses, single and multiple, and the bone cysts associated with osteitis fibrosa, periosteal and medullary bone tumors of innocent character are conspicuous by their rarity. The possible benign bone tumors are fibroma, lipoma, angioma, chondroma, osteoma, mixed forms, and pure myxoma. Although they are rare tumors, we must look out for them, because they have a tendency to become malignant, especially the myxoma and chondroma. Whenever we see a periosteal or medullary single tumor, we should look upon it as a precancerous lesion, unless we can be sure, from the clinical and x-ray pictures, that we are dealing with a benign exostosis or spur formation.

**OSTEOMA.** F. Lejars<sup>4</sup> shows the confusion in the literature in the terminology of lesions containing bone. Lejars reports five cases of what he calls osteomas in the region of the hip-joint. All of them followed trauma; in three, there was a fracture of the neck of the femur. In these cases, the bone tumor probably represents excessive callus formation after fracture. The mushroom-like bony mass attached by a pedicle to the bone extended into the psoas and adductor muscles. In two cases, the bone formation was in the muscle and had no relation to the bone. The three first cases should be called traumatic exostoses.

<sup>1</sup> Edinburgh Medical Journal, May, 1912, vol. viii, No. 5.

<sup>2</sup> Centralbl. f. Chir., 1912, S. 1062

<sup>3</sup> Transactions of the Pathological Society of London, 1857, vol. xvii.

<sup>4</sup> Centralbl. f. Chir., 1913, S. 745.

the two latter ossifying myositis. They can be distinguished from sarcoma by the character of the bone shadow. These five cases were subjected to operation because of symptoms due to the pressure of the bony growth.

Mashado<sup>1</sup> calls his two cases osteophytes. Here there was a spicule-like bony growth from the shaft of the lower end of the femur, one in a male, aged forty years, of twelve years' duration, the other in a girl of four years' duration. The larger one in the male was fragmented and, on palpation, gave crepitation, or, as the author states, felt like a bag of nuts. There should never be any difficulty in excluding malignant disease in bone formations of this character.

**PERIOSTEAL BONE FORMATION.** In the differential diagnosis of the well-known periosteal sarcoma, in which there is periosteal bone formation, from a benign ossifying periostitis, we may often encounter difficulties. Trauma is usually the etiological factor in both. In the beginning, there is little difference in the clinical history and finding. The longer the lesion is present, the less the difficulty in differentiating the sarcoma from the benign lesion in the  $x$ -rays. But at this period there is little hope for the sarcoma. Up to the present time I have found no difficulty in distinguishing traumatic and luetic ossifying periostitis from periosteal osteosarcoma. But I have never seen the sarcoma early. In my cases of periosteal osteosarcoma, there has always been some destruction of the cortical bone beneath the periosteal growth. This is not present in traumatic ossifying periostitis, and, when it occurs in syphilis, it is a late sign, when, as a rule, the clinical signs of the luetic periosteal gumma are evident. In this lesion, one should immediately take a Wassermann blood test. If this is positive, and salvarsan is administered, one observes within a few days beginning absorption in the periosteal growth. If not, exploratory incision for diagnosis should be made at once under an Esmarch, and prepared for the radical operation when sarcoma is found. König<sup>2</sup> employs, for my term traumatic ossifying periostitis, the name traumatic osteoma, or fractureless tumors. One should turn to his microscopic pictures to see how easily the inflammatory tissue formations, with bone islands, could be distinguished from osteosarcoma.

König is of the opinion that these fractureless callus tumors are rare occurrences. They must be distinguished from ossifying myositis, in that the osteoid formation is contiguous with the shaft of the bone. He also claims that the diagnosis is not difficult, but he saw his cases late. It is my opinion that if we see and investigate these cases early, in the period in which there is some hope for sarcoma, the diagnosis between traumatic ossifying periostitis and periosteal osteosarcoma will be difficult. We have as yet no  $x$ -ray pictures of either in this early

<sup>1</sup> Centralbl. f. Chir., 1913, S. 751.

<sup>2</sup> Archiv f. klin. Chir., 1906, Band lxxx, S. 64.

stage. The young granulation tissue of the periostitis may be difficult to distinguish from sarcoma.

Riedinger<sup>1</sup> reports an interesting case in which one would have no difficulty in excluding sarcoma from the  $x$ -rays (Fig. 52), nor from the microscopic section (Fig. 53), but the clinical picture was not at all unlike sarcoma. The patient was a female, aged twenty-two years; she was quite certain that the symptoms had been present but ten weeks: A palpable tumor above the patella, swelling of the knee-joint relieved by rest, made worse by exercise, restriction of flexion and extension, pain on motion. Undoubtedly, in this case, there must have been a preexisting exostosis which had suddenly begun to grow. The patients often forget slight traumas.



FIG. 52

**LYMPHANGIOMA OF BONE.** For the first time I find a reference to such a lesion. Ludwig Wrede<sup>2</sup> reports, from the surgical clinic of Lexer in Jena, two observations and finds two cases in the literature.

**CASE I** (Wrede). The patient was a female, aged fifty-six years; she had observed vesicle formation at the end of the right little finger for eight months, associated with pain under the finger nail; on two occasions, small incisions were made, and gelatinous material evacuated; the wound healed. The appearance of the finger is shown in Fig. 54. These little tumors were compressible, the skin slightly pigmented; the  $x$ -ray showed (Fig. 55) not only the light areas of the cavity outside the bone, but also that in the bone. No other lesions were found on palpation or  $x$ -ray studies; there was no history of trauma. This phalanx was removed by exarticulation. Microscopically, there are

<sup>1</sup> Deutsch. Zeitschr. f. Chir., 1906, Band lxxxv, S. 804.

<sup>2</sup> Beitr. z. klin. Chir., 1911, Band lxxiii, S. 213.

small and larger cystic cavities, partly lined by endothelium; these cavities communicate with each other and with the cavities in the bone; the wall of the cavities in the soft parts is thicker than the wall of the



FIG. 53



FIG. 54



FIG. 55

cyst in the bone; in the wall there is formation of new capillaries containing blood cells, but there is no pigment formation, nor any organization about the free blood in the tissue; near the bone lamellæ, about the marrow cyst, there are a few giant cells.

**CASE II (Wrede).** In this instance the congenital origin is without question. The patient was first seen by Pätzold, when the child was four days old, with cystic tumors in Scarpa's triangle and on the leg. These were excised. The case has been reported.<sup>1</sup> The tumors proved to be cavernous lymphangiomas. When this patient came under observation again, at the age of four years, in 1908, the swelling of the leg above the ankle and in Scarpa's triangle had increased without loss of function or any effect upon the general condition of the child. The swellings had all the general characteristics of an angioma—compre-

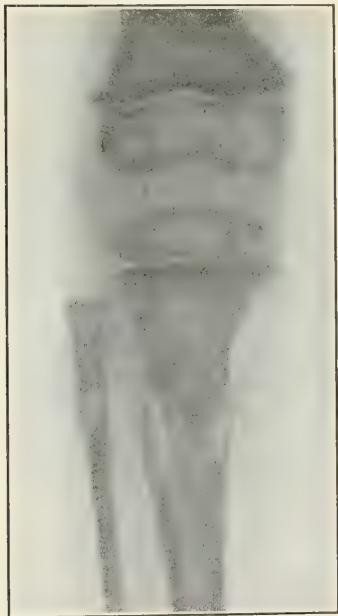


FIG. 56



FIG. 57

sibility, change in size with change in the position of the limb, and, as the swellings were translucent-like, the diagnosis of lymphangioma could be made as against hemangioma. The skin was thickened and slightly pigmented, as in elephantiasis. An x-ray taken at that time (Fig. 56) showed light areas in the tibia and fibula. It was natural to conclude that they were dilated lymph spaces in communication with the lymph spaces in the soft parts, as proved by operation and microscopic study in the first case. In 1910, when the child was six years

<sup>1</sup> Beitr. z. klin. Chir., Band li, S. 652.

of age, she was again observed, and a photograph taken (Fig. 57). The size of the lymphangiomas had increased, but did not interfere with the development of the child, or the growth of bones; the ankle, knee, and hip were free; the swellings involved chiefly the leg and the median and lateral surfaces of the thigh, most marked in Scarpa's triangle. The *x*-rays (Figs. 58 and 59) showed extension of the lighter areas in the tibia. He then gives in detail two other cases in the literature:

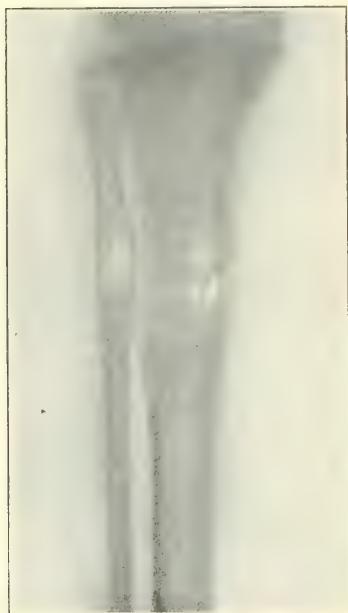


FIG. 58

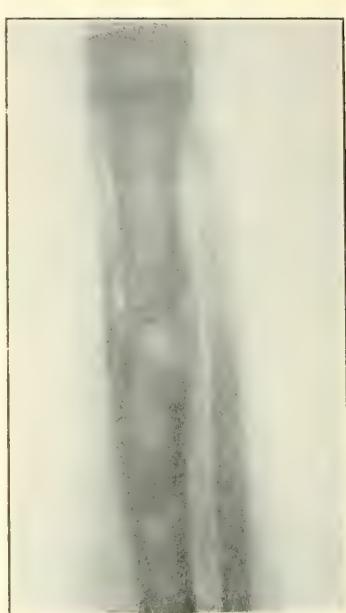


FIG. 59

**CASE III (Katholicky).** The patient was a boy, aged fourteen years, with numerous compressible swellings on the fingers, hand, and forearm of the left upper extremity. These had gradually increased since first observed four years ago. There was great loss of function. The forearm was practically useless; there was some motion of the elbow-joint, but almost none below; the swellings were compressible and fluctuation extended from one cystic cavity to the other as though there were communication. The *x*-ray showed almost complete destruction of the small bones of the hand and the wrist, with less destruction in areas of the radius and ulna. A short time before the operation, a wound in the finger was followed by the leakage of clear serum, with the collapse of all the swelling demonstrating communication between many, if not all, cystic formations. The arm was amputated above the elbow, and this specimen is preserved in the museum of the clinic.

These three cases demonstrate, without doubt, the possibility of lymphangioma involving bone. We have no evidence from which to conclude whether the involvement of the bone is primary or secondary. In these cases, the soft-part involvement does not differ from the ordinary subcutaneous or intermuscular lymphangioma.

Wrede, in the discussion, naturally asks himself whether the so-called benign bone cysts may be explained as lymphangioma of the marrow of bone without involvement of the soft parts. Personally, I cannot see any particular relation, except that the bone contains a cyst. The tissue outside of the cyst represents, microscopically, a different process than in lymphangioma.

These cases demonstrate the truth of my remarks under benign connective-tissue tumors, that some of these tumors, especially the hemangioma and lymphangioma, if not radically treated and cured in their onset, may increase in size with great loss of function, even to a condition that demands amputation of the extremity. It is my opinion that, in Wrede's second case, if the child had been kept under observation and submitted to further operation as it grew older and stronger, the late result could have been prevented.

**CHLOROMA.** Adami<sup>1</sup> places the chloroma among bone-marrow tumors. These are multiple, and involve many bones. In the gross they have a greenish or greenish-yellow tint. Dock<sup>2</sup> has demonstrated that these tumors histologically resemble lymphoid overgrowth, and they are usually found in patients suffering with a type of leukemia in which the large lymphocytes predominate. Pollock and Wutscher<sup>3</sup> report a case of chronic myeloid leukemia in which these myeloid chloromas developed before death and were confirmed at autopsy.

**PURE MYXOMA.** This is a very rare bone tumor. The case reported<sup>4</sup> in 1906 is a very interesting one. The patient was a female, aged fifty-three years, and had had a tender spot in the region of the present tumor for twenty years, the palpable tumor but nine months. This was situated near the insertion of the deltoid on the shaft of the humerus. From the  $\alpha$ -ray (*Ibid.*, p. 223, Fig. 19), one could exclude the ordinary exostosis, although the capsule of the tumor contains bone. The light shadow in the centre contains no bone. This tumor was chiselled away in 1896 by Dr. Halsted. Within a year, there was recurrence in the marrow cavity. In the next four years, four operations were performed, but, finally, amputation at the shoulder-joint had to be done because of the extensive involvement of the humerus. The histological picture of the tumor remained that of a pure myxoma, and the patient now shows no evidence of metastasis.

<sup>1</sup> *Principles of Pathology*, vol. i, p. 679.

<sup>2</sup> *American Journal of the Medical Sciences*, 1893, vol. cxi, p. 152.

<sup>3</sup> *Deutsch. Med. Wochenschr.*, 1911, xxxviii, 155.

<sup>4</sup> *PROGRESSIVE MEDICINE*, December, 1906, p. 223.

**Bone Cysts and Ostitis Fibrosa.** I have critically discussed the literature on this interesting bone lesion in the December number of PROGRESSIVE MEDICINE for many years, and presented my own experience<sup>1</sup> with 22 cases in 1910.

In the recent literature, which has collected since my contribution in 1910, there is not much new. In regard to etiology, Felten and Stolzenberg confute Lexer's view, and are of the opinion that trauma plays an important part. A few observers have noted evidences of congenital syphilis in some of their cases, and have stated that the cysts have healed under iodides and mercury, but, in the only case in which a Wassermann was made, it was negative. One cyst has been reported, associated with hemophilia. A few recurrences have been reported. In all the literature there is only one observation of late development of sarcoma. As to special localizations, a cyst has been observed in the patella. In this case it formed about a foreign body.

The majority of the writers retain the term *ostitis fibrosa*, look upon it as an inflammatory process, in which the etiological factor or factors are still obscure. All agree that there is no difference in the histology of this connective tissue between the cases in which the lesion involves the single bone and those in which the lesion is multiple, as first described by von Recklinghausen. All agree that it is a distinctly benign process, that there is a tendency to spontaneous recovery, and that the operative treatment should be conservative—curetting, if possible.

**TRAUMATIC BONE CYSTS.** Felten and Stolzenberg<sup>2</sup> are of the opinion that some of the bone cysts are the result of hemorrhage after contusion of the bone, with and without fracture. From their experimental work, they are of the opinion that there is negative pressure in the veins and in the marrow cavity of bones. After a trauma, this hemorrhage into the marrow cavity gives rise to an inflammatory process replacing the marrow tissue and cancellous bone with cyst formation. In going over 68 cases from the German literature, they find, in at least 48 cases, definite historical factors of a trauma. In only 9 cases is it negative; in 39 cases it is positive. First, there is an initial trauma—a slight contusion or fracture with recovery. Then, after weeks, months, or years, there is a secondary trauma, usually slight, with fracture. Now an *x*-ray shows the fully developed cyst. They are of the opinion that after the initial trauma, hemorrhage took place, to be followed by the pathological process with the development of the *ostitis fibrosa*, with or without cyst formation. Then, after the bone shell has become thin, another trauma produces the fracture. But, up to the present time, not a single case has been observed with an *x*-ray after the initial

<sup>1</sup> Annals of Surgery, August, 1910, vol. lii, p. 122; PROGRESSIVE MEDICINE, December, 1911, p. 245.

<sup>2</sup> Zeitschr. f. orthop. Chir., 1912, Band xxx, p. 430; reviewed in Centralbl. f. Chir., 1913, p. 730; see also Ibid., p. 723.

trauma. When *x*-rays have been taken of these bone cysts, the fully developed disease was present. This observation, however, shows the importance of an *x*-ray plate in all contusions of bone, with or without fracture, and some Röntgen examinations later.

I do not feel that Felten and Stolzenberg have brought forward any proof of the traumatic origin of bone cysts.

**HEMOPHILIC BONE CYST.** Fujii<sup>1</sup> reports a bone cyst in the metacarpal bone of the thumb in a hemophiliac. The cyst contained blood. From the microscopic examination, he is of the opinion that the cyst had no relation to ostitis fibrosa. The tumor was removed by excision.

**SYPHILITIC BONE CYSTS.** In the discussion of a paper by Jenckel,<sup>2</sup> Preiser<sup>3</sup> reports three cysts which, he is of the opinion, might have been of syphilitic origin: one in a boy, aged six years, situated in the lower end of the fibula, with a history of fracture one year ago; the patient had syphilitic iritis, and both lesions healed under iodide and mercury. In a second case, that of a girl, aged eight years, with other signs of congenital lues, there were cysts in both femoral and tibial condyles which healed spontaneously under specific treatment. In the third case, the cysts were in the acetabulum; the clinical diagnosis had been tuberculosis of the hip; the Wassermann reaction was negative, but the cysts healed spontaneously under potassium iodide and mercury.

A case has been observed in Philadelphia in which the Wassermann was positive, but I have not yet heard the result of salvarsan treatment. In my own four, recent cases, the Wassermann tests were all negative. As spontaneous healing has been observed before without medication we have as yet no positive evidence that these benign bone cysts in ostitis fibrosa have any relation to syphilis. It would be interesting, however, in future cases to take Wassermann tests and, when positive, to give salvarsan.

**BONE CYSTS AND FRACTURE.** Dr. Hollister, of Omaha, gave me the opportunity to examine the *x*-ray of a boy, aged seven years, who came under his treatment for fracture of the shaft of the femur. The interesting feature is that at least 2 cm. below the line of fracture there is a small bone cyst. The fracture healed, but at the end of eight weeks the bone cyst was still there. The parents of the patient refused operation. I may be able to add, later, the result. As far as I know, this observation is unique.

**RECURRENTS IN BONE CYSTS.** Utterström<sup>4</sup> in reporting two cases, mentions a cyst in the tibia of two months' duration after trauma, in a girl, aged six years. The cyst was lined by a brownish membrane which could be easily stripped off. The cyst was treated by curetting

<sup>1</sup> *Deutsch. Zeitschr. f. Chir.*, 1912, Band cxiv, S. 25.

<sup>2</sup> *Centralbl. f. Chir.*, 1912, S. 350.

<sup>3</sup> *Ibid.*, p. 353.

<sup>4</sup> *Journal of the American Medical Association*, 1912, vol. lviii, p. 1890.

and gauze packing. Five months later, the  $\alpha$ -rays showed a new cyst below the unhealed cavity of the previous operation. When this cyst was explored, it was found to have no lining membrane. It was curetted, but not packed. One year later, both cavities had completely healed. In this case there was no fracture.

Among my own cases, I have observed and reported one recurrence. The cyst was situated in the shaft of the humerus. At the second operation, a piece of bone from the shaft of the tibia was placed in the cyst. Perfect healing followed, and there has been no recurrence now two years since the first operation. Eisendrath, of Chicago, had a similar recurrence in a bone cyst of the humerus. Sherman, of San Francisco, did the second operation, simply curetting, and there has been no recurrence since.

We have had sufficient experience, therefore, to know that recurrences may now and then take place. This is not an indication of any malignancy, and at the second operation one may still be conservative.

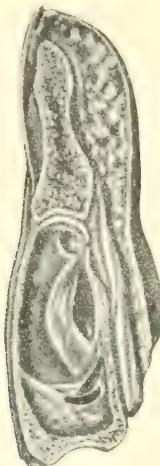


FIG. 60

**GIANT-CELL SARCOMA AND BONE CYSTS.** Fujii<sup>1</sup> resected the head of the fibula for what he thought was a bone cyst. Finding many giant cells in the cyst wall, he concluded that he was dealing with a giant-cell sarcoma. Stumpf<sup>2</sup> reports three cases. In one, the tumor was in the second phalanx; the  $\alpha$ -ray does not differ from the cases which I have reported and which, microscopically, were pure myxomas.

Stumpf's case, however, is not a myxoma. It is a benign bone cyst associated with osteitis fibrosa. Fig. 60 illustrates the gross section: The cyst has a distinct connective tissue lining. Fig. 61 shows the

<sup>1</sup> Loc. cit.

<sup>2</sup> Deutsch. Zeitschr. f. Chir., 1912, Band cxiv, S. 417.

microscopic picture; *a*, the cartilage of the joint; *c*, the fibrous tissue of the lining membrane; *b*, a bone lamella surrounded by osteoblasts and giant cells. Fig. 62 is the section of a projection from the cyst wall of brownish color; it is more cellular, contains giant cells, blood areas,



FIG. 61

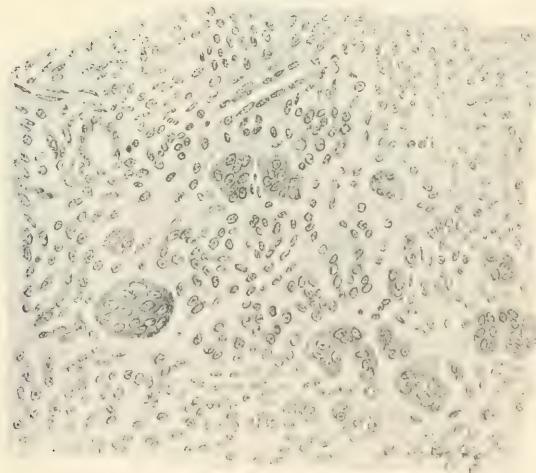


FIG. 62

and blood pigment. Histological pictures of this kind are often interpreted as sarcoma. In my own experience I have rarely failed to find them in benign bone cysts. In my previous paper, I was able to collect four cases of cysts in the so-called giant-cell tumor. I will

discuss them later under giant-cell sarcoma. Müller<sup>1</sup> has reported a case similar to Stumpf's. These two cases demonstrate that we may have, in the phalanx or metacarpal bone, a benign bone cyst, but the pure myxoma is more frequent. I have collected or observed five cases.

Utterström<sup>2</sup> mentions a cyst in the neck of the femur containing "sarcoma-like tissue," but the operation consisted of curetting only, and three years later the cavity showed no signs of malignancy.

The differential diagnosis between bone cysts due to ostitis fibrosa and giant-cell sarcoma with cyst formation and the so-called bone aneurysm, I will discuss later.

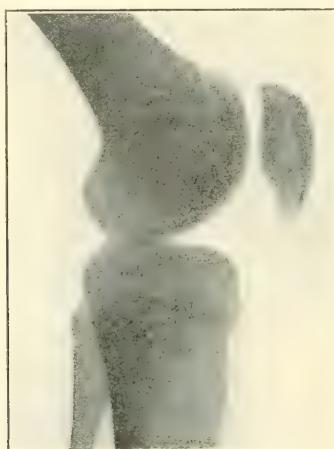


FIG. 63

RARE LOCALIZATIONS OF BONE CYSTS AND OSTITIS FIBROSA. Boit<sup>3</sup> reports a case of leontiasis ossea involving the frontal and parietal bones, and is of the opinion that the pathological process is identical with ostitis fibrosa. It is the first time I have encountered an author who has associated these two bone lesions together. Boit's article is a monograph with extensive references to the literature. He advises operations to relieve, or to prevent, cerebral pressure. The unusual localizations in the phalanx or metacarpal bones has been mentioned. Preiser, in discussing Jenckel's paper, mentions a cyst in the patella in a boy, aged seventeen years, without symptoms. The case reported by Felten and Stolzenberg<sup>4</sup> as evidence in favor of the traumatic origin of solitary bone cysts, is, in my experience, so far unique in that the cyst in the patella was present about a foreign body. This patient—a boy, aged fourteen years—seven weeks before operation had been in an explo-

<sup>1</sup> University of Pennsylvania Medical Bulletin, September, 1906.

<sup>2</sup> Loc. cit.

<sup>3</sup> Archiv f. klin. Chir., 1912, Band xvii, S. 515.

<sup>4</sup> Loc. cit.

sion, and a number of splinters of metal entered his body. For four weeks he had much pain in the region of the knee. The examination showed a healed scar, suggesting the entrance of a foreign piece of metal, and the *x*-ray (Fig. 63) shows the small cyst in the patella and the foreign body. At operation the cyst contained clear fluid but no lining membrane, and the foreign body projected into it. The etiological factor in this case is entirely different from that in any other bone cyst yet described.

**SARCOMA AND BENIGN BONE CYSTS.** Up to the present time I have not observed, nor has there been recorded in the literature, a case of sarcoma in a bone cyst or ostitis fibrosa confined to a single bone. Von Haberer,<sup>1</sup> in the discussion of Frank's paper, mentions a case of multiple ostitis fibrosa which had been observed for years in v. Eiselsberg's clinic in Vienna. This patient died, and the autopsy showed primary sarcoma with multiple metastases to lymph glands and the lung. This case suggests that there might also be a possibility for the development of a sarcoma in the single lesion, and this case can be used as an argument in favor of an operation which hastens the healing of these bone-marrow cysts.

**BONE FORMATION IN BENIGN BONE CYSTS.** Fujii,<sup>2</sup> in his very extensive microscopic study, has demonstrated the presence of new-bone formation as well as of bone destruction in ostitis fibrosa.

The clinical evidence of the spontaneous healing of these cysts may be looked upon as additional proof that ossification does take place. In a recent case which I saw with Dr. Lemon, of Milwaukee, the connective-tissue lining of the large bone cyst in the tibia stripped easily from the shell of bone. At the lower end of this cyst, the narrow cavity was filled with new bone. The *x*-ray showed this ossification, and the microscopic section of the tissue from this area proved it. This case was of additional interest, because, when the cyst was opened, the surface of the cyst was almost as white as snow. This white material could be scraped away. It proved to be a deposit of calcium. In my experience this is an unusual finding.

**X-RAY DIAGNOSIS OF BONE CYSTS.** From the very beginning there has been considerable difference of opinion as to whether a positive diagnosis of a benign bone cyst can be made from the *x*-rays. I have always taken the position that, at least in small tumors, it would be dangerous to make a positive diagnosis of a benign bone cyst, if such a diagnosis would lead to delay in operation, because other marrow or endosteal lesions of this size would probably be curable, and if delay was suggested on the diagnosis from the *x*-ray, a rare opportunity to accomplish a cure of a more malignant medullary sarcoma might be lost. And, even in this early stage, all endosteal lesions could be

<sup>1</sup> Centralbl. f. Chir., 1912, Supplement, S. 17.

<sup>2</sup> Loc. cit.

eradicated with the least mutilation. I have only seen the review of the paper by R. C. Elmslie,<sup>1</sup> but apparently he discusses, with 18  $x$ -ray illustrations, a number of endosteal tumors. Chronic abscesses without inflammatory symptoms, primary tubercular foci in the shaft of the long pipe bones to which I called attention some years ago in this journal, bone cysts, giant-cell sarcoma, thyroid metastasis, enchondroma, and the more malignant sarcoma. I would urge all Röntgenologists to be very careful about making positive diagnoses from  $x$ -ray plates of early lesions, at the stage at which operation gives best results, especially when their diagnosis leads them to advise against operation. The more one's experience grows with these  $x$ -rays, the less one feels capable of a positive diagnosis. I have a list of quite a few mistakes made in the past two years, some of them leading to delay and the missing of an opportunity to get a rare malignant tumor early. I will picture one of these cases when I discuss bone aneurysms.

**Multiple Ostitis Fibrosa.** The surgeon must be familiar with these multiple lesions, although at the present time our means of treating them, at least surgically, are restricted.

In 1910, when I went over the literature,<sup>2</sup> I found that multiple cysts had been observed in the following general diseases of the skeleton: ostitis fibrosa (von Recklinghausen's disease), 12 cases; ostitis deformans (Paget's disease), 5 cases; osteomalacia, 6 cases; multiple enchondromas, 2 cases; multiple sarcoma, 1 case; bone changes in mercurial poisoning, 1 case. No cysts had been observed in multiple myeloma, nor in chloroma, nor in metastatic carcinoma. Bence-Jones bodies were found usually in multiple myeloma and in a very few instances in metastatic carcinoma. Blood changes of the leukemic type are only found in chloroma.

Jacoby and Schroth<sup>3</sup> report a remarkable recovery in a case of multiple ostitis fibrosa with cyst formation. The patient was a female, aged forty-nine years; there had been no pregnancies; she had been bed-ridden with the disease for four years; there was an unhealed pathological fracture of the humerus of some months' duration, a visible and palpable swelling of the tibia, the bone shell of which gave parchment crepitation. The  $x$ -ray showed numerous cyst formations in all the bones of the skeleton, but as yet there were no marked deformities. The patient was given calcium lactate for months, and repeated  $x$ -ray exposures over the ovaries. The fractures of the humerus healed with good callus formation, the large cyst in the tibia healed, and the  $x$ -ray showed ossification of most of the marrow lesions. The patient was able to be up and about.

<sup>1</sup> St. Bartholomew's Hospital Reports, 1912, vol. xlvi, reviewed in Centralbl. f. Chir., 1913, S. 730.

<sup>2</sup> Annals of Surgery, August, 1910, p. 35.

<sup>3</sup> Mitteilungen a. d. Grenzgeb., 1912, Band xxv, p. 393.

**Giant-cell Sarcoma.** I find little to add to my report<sup>1</sup> in 1912. All the evidence points to the conclusion that the giant-cell tumor, whether it occur in the marrow or in the periosteum of the long pipe bones, or in the cavity of the lower jaw, or as an epulis on the alveolar border of the jaw, or as a tumor attached to tendon sheaths, is benign, or of a relatively low grade of malignancy. One generally finds, in the giant-cell tumor, whitish areas which cannot be distinguished histologically from osteitis fibrosa, and in osteitis fibrosa one finds currant-jelly masses of tissue which may resemble the giant-cell tumor. It was very interesting to me to read the recent remarks of Kümmel<sup>2</sup> in a discussion of Jenckel's paper. He said that many years ago Volkmann was of the opinion that no surgeon would amputate for giant-cell sarcoma of bone. Volkmann made this remark in the discussion of another surgeon's report of a case of giant-cell sarcoma of the femur. The patient had refused amputation, so the surgeon was compelled to curette, and he was surprised to find that his patient remained free from recurrence. If I am familiar with the literature, Volkmann must have been as ignorant of what the majority of the surgeons were doing for giant-cell sarcoma as these surgeons were ignorant of Volkmann's views which today are by no means universally accepted as true. Yet, it appears to me, from the evidence, that it is difficult to come to any other conclusion. Jenckel then stated, in conclusion, that when Braun investigated 35 cases of sarcoma of the femur he found that he had four recoveries—all of them giant-cell sarcomas: one had been amputated, two resected, and one curetted. Marchand, in restudying the tissues, came to the conclusion that the tumors were what we now call osteitis fibrosa with giant-cell areas.

George Barrie<sup>3</sup> advocates the term "chronic non-suppurative osteomyelitis" for the giant-cell tumor. This medullary lesion has been called "medullary giant-cell sarcoma, myelogenous sarcoma, and myeloma." Barrie is of the opinion, in his conclusions, that this more or less specific medullary bone lesion should not be included in tumors; he also believes that the lesion is the result of a trauma, and the pathological process is inflammatory rather than neoplastic; that the giant cells are osteoclasts due to the bone absorption in vascular granulation tissue.

Whether this lesion is inflammatory or not, I think it would be a mistake and misleading to drop the now well-established terminology "giant-cell." At the present time, the term "medullary giant-cell tumor" expresses the exact finding. We speak of callous tumors and keloids: Keloids are classed with tumors, not with inflammations.

<sup>1</sup> Annals of Surgery, August, 1912, p. 211; PROGRESSIVE MEDICINE, December, 1912.

<sup>2</sup> Centralbl. f. Chir., 1912, S. 355.

<sup>3</sup> Annals of Surgery, 1913, Band lvii, p. 244.

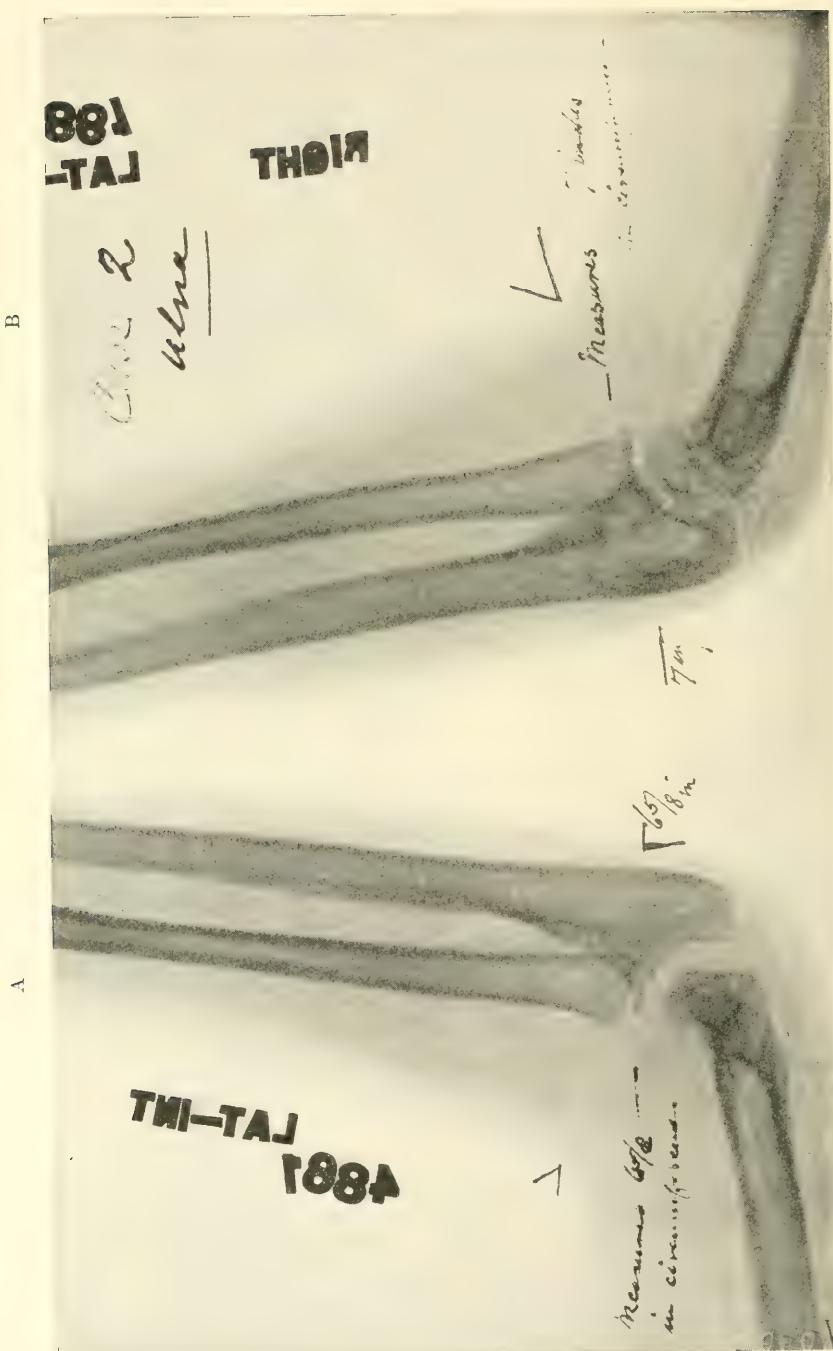


Fig. 64.—A. Normal. Chronic (non-suppurative) hemorrhagic osteomyelitis. Ulna. (Case II.)

Barrie reports three cases. In his first case, the giant-cell tumor was situated in the internal condyle of the right femur; at the exploratory incision the typical red, friable, granulation-tissue-like masses were exposed; the bone capsule was preserved. The operation consisted of curetting. The ultimate result is not given.

In the second case the position was an unusual one—in the olecranon and the upper end of the ulna. No operation was performed in this case. The *x*-ray (Fig. 64) illustrates a distinct lesion, but I do not see how a benign bone cyst could be excluded.

In his third case the lesion was situated in the internal malleolus in the tibia. At the exploratory operation the typical giant-cell tissue was found. The bone cavity was curetted. Barrie is of the opinion that the employment "of pure carbolic acid, followed by alcohol or chloride of zinc to destroy the tissue left behind by the curette, must retard the normal healing process and does not seem necessary." My personal experience, and the reading of the literature, demonstrate that this disinfection after curetting has never interfered with healing. When recurrence has followed curetting, this disinfection had not been done. Barrie recommends tincture of iodine for swabbing the cavity. We have no experience as yet with this. Why not employ the stronger disinfectant which has proved efficacious after a long experience?

Barrie's investigation simply brings additional evidence in favor of the benignity of this giant-cell tumor.

Mathews<sup>1</sup> unfortunately uses the term myeloma, similar to Adami.

Adami<sup>2</sup> discusses the giant-cell sarcoma with the bone-marrow tumors, or myelomas, and calls them the giant-cell myeloma. He also states that this tumor does not form metastases save in very infrequent cases, when it undergoes sarcomatous changes.

Mathews' cases also illustrate the benignity of the giant-cell tumor.

**CASE I.** Female, aged forty years; amputation at the knee-joint for medullary tumor of the upper end of the tibia. This case is of special interest, because the tumor had destroyed the bony capsule in places, and there was distinct pulsation over the position of the inner tuberosity of the tibia. This patient is well nineteen years after operation. Mathews illustrates an *x*-ray of the specimen which has been preserved (loc. cit., Fig. 1). I believe today the majority of surgeons would be willing to attempt to curette the moderately small lesion. The fibula side of the upper end of the tibia is not involved. This is interesting, because in this case the bone capsule on the inner tuberosity was so thin that there was pulsation. Still the bone below on the diaphyseal side and toward the outer tuberosity was not yet involved. I emphasize this point, because some authorities give the opinion that perforation of the bone capsule in a giant-cell tumor is a sign of

<sup>1</sup> Annals of Surgery, 1910, vol. lii, p. 389.

<sup>2</sup> Principles of Pathology, vol. i, p. 676.

increased malignancy. The evidence of my personally studied cases and of those in the literature which I have been able to critically examine do not confirm this.

CASE II. Female, aged twenty-eight years; amputation at the knee-joint for medullary tumor at the upper end of the tibia. The patient is well four years after operation. Dr. Mathews illustrates a photomicrograph of the tumor. It is a typical giant-cell tumor. In the microscopic description, he speaks of the vascular spindle-cell stroma about the giant cells in these tumors. In my investigation of these



FIG. 65.—Round- and polyhedral-celled myeloma. (Case III.)

tumors I would not call the stroma spindle-cell. If we leave out the predominant cell, the giant cell, we have a tissue resembling vascular granulation tissue, quite different from the mixed spindle-and-round-cell sarcoma, or the pure spindle- or the round-cell sarcoma.

CASE III. This is of special interest to me, because, histologically, it does not resemble the giant-cell tumor, but rather a mixed round-cell sarcoma. The patient was a male, aged thirteen years; there had been tenderness in the middle of the shaft of the tibia for two months without

a history of trauma. The shaft of the tibia was swollen in fusiform shape, and there seemed to be one perforation in the bony shell. The skin over this soft area was bluish. At the exploratory incision, this perforation was enlarged by stripping back the periosteum and removing some of the bony shell. The tumor tissue was red and vascular; it was removed with the curette, and Dr. Mathews states that there has been no recurrence seven years since operation. The microscopic picture (Fig. 65) does not suggest to me the giant-cell tumor, nor does the second photomicrograph (Fig. 66) where there are some giant cells.

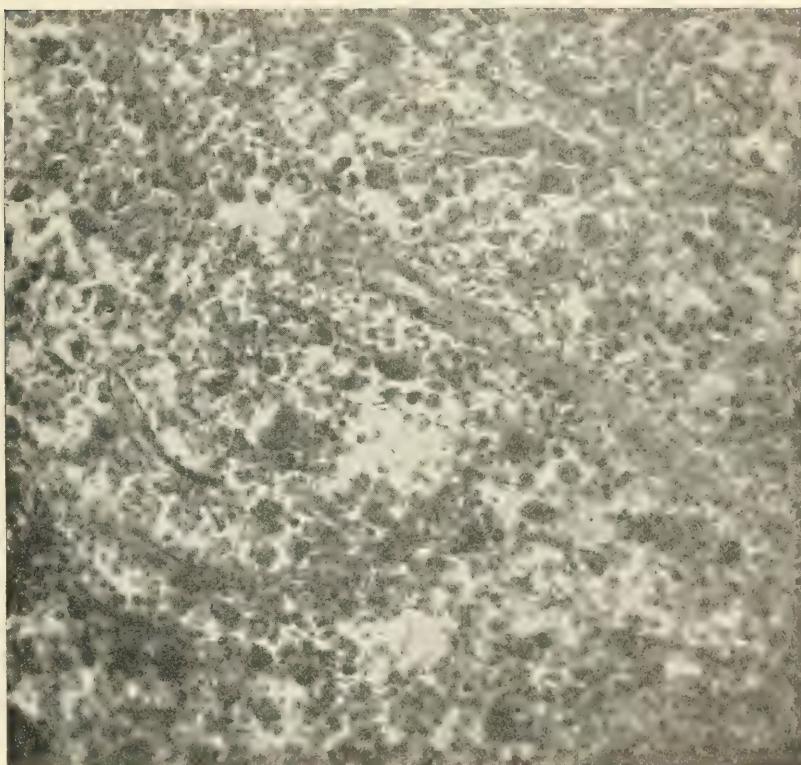


FIG. 66.—Small area showing perivascular giant cells. (Case III.)

Up to the present time I know of not a single medullary sarcoma of the round-cell or mixed-cell type cured by curetting. In fact, there are only a few cures after resection or amputation, as these tumors kill quickly by metastases. The lesion in this third case of Mathews was relatively early—two months. We might ask ourselves the question, What is the early picture of the giant-cell tumor? Personally, I have never seen an early case. The lesion in my cases has been present not less than six months, usually one or more years. Mathews is of the

opinion that this marrow tumor is composed of marrow cells, yet his illustrations do not look like the well-known multiple myeloma. This tumor can also be excluded here, because the patient still lives and no



FIG. 67.—Osteosarcoma of upper end of tibia. (Case V.)

multiple tumors have developed. In the clinical investigation of this case, no Wassermann test was made, and no examination for Bence-Jones bodies, but syphilitic marrow lesions are very rare.

**CASE IV.** Here we have only an *x*-ray of the medullary lesion expanding the lower end of the femur in a girl, aged ten years. It is interesting to note that, five years before this *x*-ray was taken, a supracondyloid osteotomy of the femora had been performed. Symptoms developed a few months after the operation. Mathews is of the opinion that his *x*-ray suggests a giant-cell myeloma, but I feel that a bone cyst cannot be excluded. I trust that a later operation will reveal the pathology in this case. It is the first medullary tumor to develop after an osteotomy, as far as my investigation has gone.

The pathology, in his Case V, is not given, but as there was evidence of metastases and local recurrence after an amputation for a lesion of the upper end of the tibia, we can be confident that it was one of the more malignant types of sarcoma. The *x*-ray (Fig. 67) shows a periosteal, ossifying growth. I have seen a number of cases of this kind, and all have died of metastases in spite of amputation. The tumors are generally spindle-, or mixed spindle-and-round-cell sarcomas. The amount of new-bone formation varies. When bone formation predominates in the periosteal growth the prognosis is better.

Mathews, in discussing my critical reviews of giant-cell sarcoma in PROGRESSIVE MEDICINE, agrees with the conservative treatment advocated, but dislikes the word sarcoma. He writes, "So long, however, as these tumors retain the name sarcoma, we may expect the average surgeon to accord them the usual treatment of sarcoma, namely, the widest possible removal." If this is true, I am willing to call this tumor almost anything, if it will influence surgeons in favor of conservative treatment. But if the name sarcoma, or carcinoma, is to influence the average surgeon to the widest possible removal in all cases, we will have to change many names, because there are different types of sarcomas and of carcinomas, and these influence the extent of the operation. The localization of the disease also influences the extent of the local removal. In my opinion, it would be better for the average surgeon to familiarize himself with the present-day opinion as to what the usual operation should be for a definite disease in a definite localization.

**METASTASIS IN GIANT-CELL SARCOMA.** Every now and then in the literature, or from personal correspondence, I have been informed of a case of giant-cell sarcoma in which the patient died of metastasis. Some of these cases I have been able to investigate and have found that the tumors were not giant cell, but the most malignant sarcoma of the cellular type containing some giant cells, and that, when the metastatic tumors have been examined, there were no giant cells.

J. Clark Stewart<sup>1</sup> reports two such cases.

**CASE I.** Male, aged thirty-five years; tumor in base of great toe; slow growth; pulsation. At this time a diagnosis of aneurysm was

<sup>1</sup> *Surgery, Gynecology, and Obstetrics*, 1913, vol. xvii, p. 30.

made, and the dorsalis pedis artery was ligated. Then a secondary tumor developed in the middle of the tibia. The patient now came under the care of Dr. James E. Moore and Dr. Stewart. In amputating the leg above the second tumor, the external saphenous vein was found to be plugged with tumor tissue. The patient died a few months later with metastasis to the brain. The primary tumor was in the marrow cavity of the metatarsal bone, the secondary tumor in the marrow cavity of the tibia. According to Stewart, the two marrow cavity tumors, the tissue in the vein were all typical giant-cell sarcoma. He does not state specifically whether the brain tumor was examined. The total duration of the disease in this remarkable case was two years. I should like to have the tissues in this case submitted to a number of pathologists before I would be willing to concede that we are dealing with a typical giant-cell tumor.

CASE II. Male, aged thirty years; history of fracture of left arm; non-union; three months later examination; diagnosis, sarcoma. Amputation at shoulder. Recurrence and death in six months. The tumor was a medullary sarcoma in the upper shaft of the humerus. The bone shell had been destroyed from a distance four inches below the shoulder-joint to within two inches of the elbow; the muscular tissue was deeply infiltrated by the tumor tissue. "The microscope showed a typical giant-cell sarcoma with spindle-cell matrix."

In these two cases we have a clinical picture entirely different from that in the giant-cell tumor. In Case I, two lesions and involvement of the superficial veins; in Case II, a destruction of bone which we only see in the most malignant type of sarcoma. I trust to be able to add in a foot-note something as to the histology of these two tumors, as I have written Dr. Stewart for tissues.

**Bone Aneurysms.** Gaylord<sup>1</sup> was apparently the first to give a comprehensive report in American literature on these rare medullary tumors. Nakayama<sup>2</sup> reported three cases from Garré's clinic in Bonn, and added some new cases from the literature. In 1910, I reported<sup>3</sup> three personally studied cases in my paper on bone cysts and giant-cell sarcoma, and discussed the cases reported by Gaylord and Nakayama. In the same year, A. Le Dentu<sup>4</sup> reported seven cases, and considers the entire literature. I have been unable to get the original, but the review states that the tissue about the hematoma in five cases was a vascular sarcoma; in two, a simple sarcoma, that is, in all seven cases cellular sarcoma of the more malignant types. The most frequent situation

<sup>1</sup> Annals of Surgery, 1903, vol. xxxvii, p. 834.

<sup>2</sup> Beitr. z. klin. Chir., 1909, Band lxiv, S. 524.

<sup>3</sup> Annals of Surgery, August, 1910; Transactions of the American Surgical Association, 1910.

<sup>4</sup> Centralbl. f. Chir., 1910, vol. xxxvii. p. 647.

according to Le Dentu, is the lower epiphysis of the femur and tibia. Le Dentu found that, in many of the cases, the tumors pulsated.

I have now seen five cases. Pulsation, or bruit, was not present in any. The term bone aneurysm came into the literature many years ago, as far back as 1769, when cases were reported by Percival Potts and Elsie, and later the term was employed by Richet and Volkmann. The earlier observers were of the opinion that the lesion was a true aneurysm, but we now know that the medullary hematoma is always surrounded by tumor tissue and that it corresponds to other hemorrhagic cystic sarcomas. The unusual feature is the large blood cavity, the narrow zone of tumor tissue, and, as a rule, the expanded bone-shell is preserved. The malignancy of these tumors is the same as that of the other medullary sarcomas of the same histological type. Such hematomas have never been observed in the benign bone cysts or *ostitis fibrosa*, and only very rarely in the giant-cell sarcoma.<sup>1</sup>

The differential diagnosis should be made with the frozen section. On exploring such a marrow tumor, the large blood cavity would at once make the surgeon suspicious of this malignant tumor. A frozen section of the tissue within the bone-shell will at once distinguish it from the giant-cell tumor. In the cases which I have observed, this tissue surrounding the hematoma is so hemorrhagic that it is impossible to distinguish it from the vascular giant-cell tumor. Here the frozen section is most helpful.

This is illustrated in a case of sarcoma of the humerus reported by Dr. Coley.<sup>2</sup> The patient, a male, aged thirty years, first came under the care of Dr. Finney, in Baltimore, in June, 1910. There was a history of injury to the left shoulder two years before, and again, six months ago, a fracture of the shaft of the humerus. In spite of apparently good bony union, there was so much pain that an x-ray was taken; this showed a marrow shadow suggesting a medullary sarcoma. Dr. Finney operated, found a blood cavity surrounded by vascular tissue. This was curetted and sent to the Surgical Pathological Laboratory of the Johns Hopkins Hospital. When I saw the fresh tissue, without knowing the history and the findings at operation, I thought it would prove to be a giant-cell tumor, but the frozen section at once demonstrated a mixed round-and-spindle-cell sarcoma; there were a few giant cells. After this diagnosis, Dr. Finney sent the patient to Dr. Coley. He was treated with the mixed toxins with apparent relief, but later there was a recurrence, and, after further attempts at curetting, the arm was amputated. This amputation took place after Dr. Coley's report above referred to. But I am informed that this patient is still living in apparently good health, now almost three years since the first curetting. If this patient is permanently cured, it will be

<sup>1</sup> See Bloodgood, *Annals of Surgery*, August, 1910, Fig. 38.

<sup>2</sup> *Annals of Surgery*, 1911, vol. liii, p. 286.

evidence in favor of the toxins, although this treatment did not prevent further local growth or save the patient from amputation. We must recollect, however, that Case II reported by me lived three years and eight months after a shoulder-joint amputation by Cushing, and then developed local recurrence and internal metastases after four months. So that, as a matter of fact, this case of Finney and Coley, apparently free from recurrence after a shoulder-joint amputation, has not lived as long as Cushing's case. This latter received no toxins. The disease was much more extensive.



FIG. 68

I have recently had another bone aneurysm of the lower end of the femur. The patient was a female, aged fifty-five years, and was referred to me by Dr. Penrose, of Baltimore, with a probable diagnosis of chronic arthritis of the left knee-joint. This patient has been under the care of my colleague, Dr. Baer, who had treated her for arthritis;  $x$ -rays had been taken one year ago and recently by Dr. Baetjer. The picture was that of an arthritis; the symptoms had been present about eighteen months: pain and swelling in the knee, and a little stiffness. When Dr. Baer saw her, one year ago, she complained of pain in the knee,

there was some fluid in the joint, motion at the joint was slightly restricted and painful. Baking, which usually relieves an arthritis, increased the pain. Fixation in plaster was so painful that it had to be removed. When I saw the patient, the only change was a contraction at the knee to about a right angle, and restriction of motion to about 15 degrees from this position. The swelling about the knee-joint appeared to be due to fluid in the joint. There was no marked thickening of the capsular tissue, and no evident expansive enlargement of the lower end of the femur, nor of the upper end of the tibia. The *x-ray* (Fig. 68) shows that the architecture of the femur is entirely



FIG. 69.—Bone aneurysm.

different from that of the tibia, fibula, and patella. The shadow of the outer condyle as it projects beyond the inner condyle is lighter than the shadow of the inner condyle. I did not for one moment think that the entire lower end of this femur was filled with a blood clot lined by tumor tissue. Yet this was so. It shows how limited as yet is our knowledge of, and experience with, the *x-ray* picture of bone lesions. However, in this case there were two reasons to operate: (1) The pain and the disability due to flexion; (2) to clear up the diagnosis in a case clinically doubtful. I was of the opinion that if it proved to be an arthritis, resection, with the formation of a straight, stiff knee, was the operation of choice. The incision was made for resection, the knee-

joint cavity opened. It contained clear fluid; the synovial membrane was red and vascular as seen in chronic traumatic arthritis, but the most conspicuous finding was a crack in the cartilage over the external condyle through which one could see red, vascular tissue; yet no blood had leaked into the joint. When I pressed this cartilage back and broke the little zone of vascular tissue, free and clotted blood exuded. But there was no pulsation. I felt pretty certain that I must be dealing with a bone aneurysm. In a younger individual I would have resected, but the patient was old and feeble, and I felt that for the time she had to live she would be more comfortable with an artificial limb. The

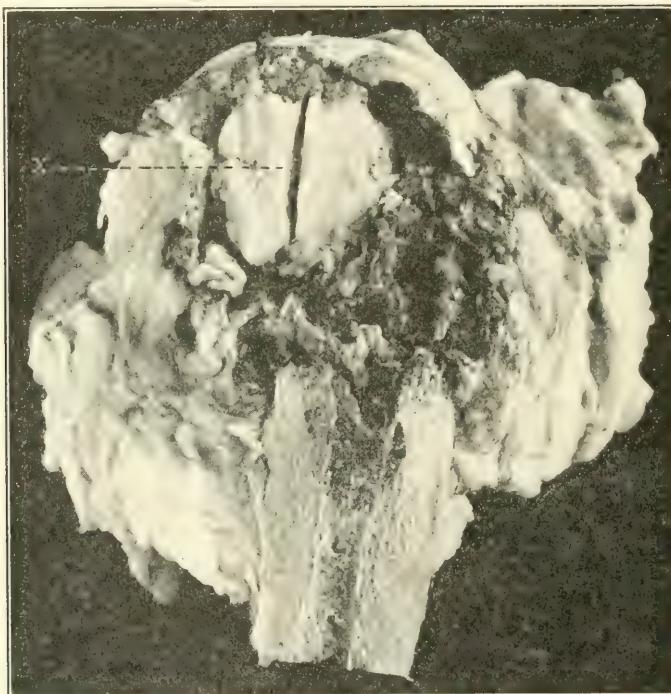


FIG. 70.—Bone aneurysm.

specimen is shown in Figs. 69 and 70. There is not much expansion of the bony shell; the cavity was lined with cellular, friable tumor tissue, not at all the appearance of giant-cell tumor, but filled with blood and contained one tumor mass seen at *X* in the illustration. The microscopic sections showed a mixed-cell sarcoma.

I trust to be able to collect and report these cases of bone aneurysm and to give a clinical and pathological picture from my accumulated experience which will allow us to recognize this malignant disease in an earlier stage.

The lesion must be obscure, because in this case one year before opera-

tion, after a most careful clinical and *x*-ray study by an experienced surgeon and Röntgenologist, a diagnosis of chronic arthritis was made. When I saw the patient, the symptoms, irrespective of the diagnosis, were sufficient to urge operation, and even then the correct diagnosis was not made until the exploratory incision revealed the lesion.

**Multiple Myeloma.** Ernest W. H. Groves<sup>1</sup> contribution is of special interest, because it gives excellent *x*-ray pictures of the various bone lesions. The case is also of additional interest, because the pathological fractures firmly united. The diagnosis in this case was based on the clinical history, the *x*-ray findings, and the presence of Bence-Jones bodies in the urine. The symptoms were of twelve years' duration in a male previously unusually strong, and at the time of the report the patient was free from pain, no further tumors or pathological fractures had developed. His only discomfort is the deformity due to the badly united fractures. The albumosuria still remains. We have, therefore, no absolute proof that the disease is really a myeloma. It is certainly some type of a multiple marrow lesion. In the majority of cases of multiple myeloma the patients do not live as long as this. Had this patient received *x*-ray treatment, or some serum, one might have concluded that the improved condition was due to this therapy. Here we have apparently a spontaneous cure of a disease usually fatal.

This case, of course, cannot be employed until the diagnosis is confirmed by a pathological examination of a bone lesion.

The best histological description of the multiple myeloma is given by H. A. Christian.<sup>2</sup> Stumm<sup>3</sup> reports two cases, both with autopsies, in which the clinical diagnosis was confirmed. He gives, in addition, numerous references to the literature on this subject. One may always turn to Stumm's article, therefore, for the complete literature up to 1912.

<sup>1</sup> Annals of Surgery, 1913, vol. lvii, p. 163.

<sup>2</sup> Transactions of the Association of American Physicians, 1907, vol. xxii, p. 145.

<sup>3</sup> Surgery, Gynecology, and Obstetrics, 1912, vol. xv, p. 653.



# PRACTICAL THERAPEUTIC REFERENDUM.

By H. R. M. LANDIS, M.D.

**Adrenalin (Epinephrin).** The treatment of *asthma* by means of adrenalin is a well-recognized procedure although McCord,<sup>1</sup> in a review of the literature, states that adrenalin has not been used very extensively by the general practitioner, because of the fear of evil secondary effects. At the time of injection, there may be certain transient effects of an unpleasant, but not serious, nature. Severe palpitation of the heart may occur, and a peculiar restlessness, associated with pallor of the face, may set in. These symptoms pass off quickly, however, and the asthmatic breathing disappears, the respirations becoming easier and softer.

McCord thinks that the following conclusions are justifiable: (1) Adrenalin extends the lumina of the contracted bronchioles. (2) This dilatation of the bronchioles is probably the basis for the beneficial action of adrenalin in the treatment of asthma. (3) The dilatation follows subcutaneous, intravenous, and endobronchial administration. (4) The action is transient, but very effective in relieving the acute attack. The subcutaneous administration apparently is the most transient. (5) The administration is simple, and no injurious results follow as a secondary sequence.

Staübli<sup>2</sup> highly recommends adrenalin in the treatment of asthma. He employs a solution, 0.05 to 1 c.c., injected subcutaneously.

Inhalations of adrenalin have been tried frequently, but for the most part have failed because the spray was so coarse that most of it was deposited in the mouth and throat, and never reached the lungs. Having found a suitable atomizer, Staübli, after numerous experiments, found the following solution a satisfactory inhalant:

Adrenalin (1 to 1000) . . . . .	9.000 c.c.
Atropine sulphate . . . . .	0.010 c.c.
Cocaine hydrochloride . . . . .	0.025 c.c.
Water, distilled . . . . .	1.000 c.c.

Or,

Adrenalin solution . . . . .	18 drops
Atropine-cocaine solution . . . . .	2 drops

<sup>1</sup> Medical Record, March 8, 1913.

<sup>2</sup> Münch. med. Woch., January 21, 1913.

The atropine-cocaine solution is prepared as follows:

Atropine sulphate . . . . .	0.10
Cocaine hydrochloride . . . . .	0.25
Distilled water . . . . .	10.00

If the asthmatic attack is very mild, the ordinary 1 to 1000 adrenalin may be used alone. He has never seen any bad by-effects from the inhalations and the influence seems to be more lasting than when the drug is given subcutaneously.

Having successfully treated asthma with hypodermic injections of adrenalin (1 to 1000), Fletcher<sup>1</sup> tried its effect in *whooping cough*. He thinks the adrenalin had a distinctly beneficial effect in controlling the severity and frequency of the paroxysms. He administered the adrenalin by mouth, in doses of from 1 to 3 minims in water, every three hours in the more severe, and every four hours in the milder cases.

Kretschmer<sup>2</sup> reports a case of profuse, painless *hematuria* successfully treated with injections of epinephrin directly into the pelvis of the kidney through a ureteral catheter. Operation being refused, it was determined to try the effect of epinephrin. Five c.c. of a solution consisting of 50 per cent. epinephrin and 50 per cent. salt solution was injected into the pelvis of the left kidney. The following day the amount of blood had greatly diminished. Three days later the injection was repeated, and again four days later. The urine then became clear. Kretschmer points out the following advantages in this method of controlling renal hemorrhage. (1) If, by this simple procedure, we are able to control the renal bleeding, the condition of the patient's urine may be studied at a time when it is free from large quantities of blood. (2) In cases in which there is a severe degree of secondary anemia, due to the loss of large quantities of blood, the patient may be put on a general tonic treatment besides the epinephrin treatment, until such improvement is reached as will render operation a safe procedure. (3) It may be the means of avoiding nephrectomy.

Kretschmer does not recommend epinephrin injections except for cases of idiopathic hematuria; but it may be used temporarily in hemorrhage cases due to tuberculosis, tumor, or stone.

Gaisböck<sup>3</sup> reports on the effects of epinephrin in *inflammatory processes involving the joints*. Not only did the injections relieve the pain, but they also exerted a favorable, even a certain curative, action on the inflammatory process, without regard to the origin of the trouble. The epinephrin is injected subcutaneously in the dose of 1 c.c. of a 1 to 100 solution, and repeated until as high as 24 c.c. have been injected.

<sup>1</sup> British Medical Journal, December 28, 1912.

<sup>2</sup> Journal of the American Medical Association, July 5, 1913.

<sup>3</sup> Med. Klin., March 16, 1913.

Bossi<sup>1</sup> reports a case of *osteomalacia* successfully treated by injections of epinephrin. The treatment extended over a period of nine months, during which time one hundred and fifty injections were given; 1 c.c. of a 1 to 1000 solution, was the largest single dose. Bossi had previously reported on the good effects of epinephrin in osteomalacia.

Schmidt<sup>2</sup> also reports 2 cases of osteomalacia which were treated with epinephrin. After ten injections of 1 c.c. of a 1 to 1000 solution, the ostalgia disappeared completely.

Schmidt believes there is some connection between osteomalacia and *chronic joint conditions*, and that epinephrin should be beneficial in the latter. His results to date seem to justify this assumption, as the patients almost always feel considerable relief shortly after the injection, and, in addition, there is often a rapid decrease of the effusion into the joints. The injections are given in the anterior surface of the thigh, in the dose of  $\frac{1}{2}$  to 1 c.c. of the 1 to 1000 solution. In this connection, mention might be made of an article by Pemberton<sup>3</sup> on the treatment of chronic joint disease. He states that there are certain cases which, while rebellious to all other forms of treatment, can be arrested by a proper dietary coupled with colonic lavage.

Sargent and Lian<sup>4</sup> report six cases of severe, uncontrollable *vomiting of pregnancy* which were due to adrenal insufficiency. They give the following picture of *adrenal insufficiency*: Asthenia, ranging from lassitude to almost complete inability to move; digestive disturbances, vomiting, diarrhea or constipation; pain in the lumbar region and abdomen; and circulatory disturbances, such as low blood pressure and a tendency to syncope which may end in sudden death. They believe that the pregnancy should never be interrupted because of vomiting until epinephrin has been thoroughly tried.

Martin<sup>5</sup> states that in either the natural or the artificial *menopause*, circulatory disturbances often occur, the blood pressure being abnormally high or low. In patients with an abnormally low pressure, he had excellent results from the administration of two or three drops of a 1 to 1000 solution three times a day by mouth, and continued over a period of from one to four months. The heart action was much improved and the depression, headache, and tendency to insomnia subsided during the treatment. No cumulative action was noted, nor was the stomach adversely affected.

A. W. Swann<sup>6</sup> has found epinephrin administered subcutaneously, a valuable remedy in the treatment of *urticaria*. He injects about 8

<sup>1</sup> Centralbl. f. Gynäk., October 12, 1912.

<sup>2</sup> Med. Klin., September 15, 1912.

<sup>3</sup> American Journal of the Medical Sciences, October, 1912.

<sup>4</sup> Lanceet, December 28, 1912.

<sup>5</sup> Berl. klin. Woch., September 9, 1912.

<sup>6</sup> American Journal of the Medical Sciences, March, 1913.

minims of a 1 to 1000 solution for an adult of one hundred and forty pounds, and repeats the dose in ten minutes. In the 6 cases reported, the 2 doses always proved sufficient.

Improvement was evident in eight minutes after the first injection. After twenty minutes, all that usually remained of the eruption were some erythematous blotches or small, pale wheals, which continued to fade until the skin was entirely normal. The itching ceases in from five to twenty mintues after the first dose.

Silvestri<sup>1</sup> believes that adrenal insufficiency is the rule in *tuberculosis*. He reports 14 cases treated on this hypothesis, with alleged good results. He employed both the commercial preparations and the freshly prepared gland. Believing, furthermore, that, in addition to the adrenal insufficiency, there is also an abnormal utilization of the calcium salts, the latter were combined with the adrenalin.

As a result of an investigation of the action of the heart in animals under chloroform anesthesia, Levy<sup>2</sup> found that the injection of 5 minims of a 1 to 1000 solution of adrenalin first accelerated the pulse and raised the tension, then the pulse becomes accelerated, at times irregular, with temporary pauses, and then suddenly ceases. Respiration also fails. In favorable cases, the heart eventually becomes regular and normal breathing is restored.

Levy's conclusion is that it is unsafe to inject adrenalin into the veins or vascular tissues of a patient lightly under the influence of chloroform. It may be injected safely just prior to the induction of chloroform anesthesia, or into a patient thoroughly under the influence of chloroform, or into a patient anesthetized with ether.

**Antidiphtheritic Serum.** Park<sup>3</sup> has shown by animal experimentation that it is essential, in the administration of diphtheria antitoxin, to give an initial dose which is sufficient to neutralize the toxins. One should not start out with the idea that in these cases, two, three, or four doses of antitoxin are necessary; a single dose, sufficiently large, should be all that is needed. Park recommends, for the mild and moderately severe cases, an initial dose of from 5000 to 10,000 units. The giving of larger doses than necessary does no harm. The only objection which could be urged against the large dose is the expense to the city or patient; this, of course, is not worthy of consideration. He especially warns against an insufficient first dose, which may prove a serious mistake.

In severe, malignant cases, where neutralization of the toxins must be accomplished as soon as possible, Park insists on the intravenous administration of the antitoxin. He feels certain that 5000 units given intravenously has as much effect as 20,000 units injected subcutaneously.

<sup>1</sup> Abstract, Journal of the American Medical Association, September 20, 1912.

<sup>2</sup> British Medical Journal, September 14, 1912.

<sup>3</sup> American Journal of Obstetrics, January, 1913; Boston Medical and Surgical Journal, January 16, 1913.

Intravenous injections of refined antitoxin have been made by him in nearly 200 cases, with no bad results. The serum should be warmed to blood heat before injecting it.

Schone<sup>1</sup> concludes, from a series of intravenous injections of antitoxin in guinea-pigs, that very large doses have no harmful effects and that by their use many patients with a severe infection can be saved who would otherwise die with smaller dosage, especially if the antitoxin is not given early.

In regard to the danger of anaphylactic shock, Hare<sup>2</sup> sums up the situation as follows:

"In the ordinary individual, not asthmatic and not sensitized by the previous use of serum (twelve days or more before the dose which is immediately under contemplation), the danger is so remote that it should never delay the physician's hand a moment in the administration of this valuable remedy in the presence of diphtheria or tetanus. If the physician believes, for the reasons just given, that the patient is unduly sensitive, the subject should be etherized and should receive a hypodermic injection of atropine, and simultaneously receive, hypodermically, a very small testing dose, 0.1 or 0.2 c.c. If, in the face of these precautions, disaster occurs, the physician is not blameworthy because it is essential to administer the antitoxin to combat the likelihood of death from the infection, and because he has utilized all the protective measures which are known to science in an endeavor to prevent a manifestation of this unusually interesting, but nevertheless dreadful, result of a well-recognized therapeutic procedure."

In this connection, it should be noted that Nemmser<sup>3</sup> has never noted anaphylaxis in the course of an extensive experience with preventive injections of antitoxin. In an analysis of 3000 case records of scarlet fever patients, in whom prophylactic injections of diphtheria antitoxin had been given, no serious untoward effects resulting from the injections were noted. In 1002 instances, more than two preventive doses of serum were administered, but aside from a serum eruption in 42 cases, he does not recall seeing anything of an alarming nature.

J. D. Rolleston writes<sup>4</sup> favorably on the use of bouillon cultures of *Staphylococcus pyogenes aureus* in the treatment of diphtheria bacillus carriers. He reports 8 chronic diphtheria bacillus carriers treated by this method. In 6 faecal cases, the findings became negative within two to seven days after starting the treatment. In 2 nasal cases, the treatment was ineffective. In almost every case a mild form of sore throat was produced, but no complication ensued.

He states that, as the process entails some degree of discomfort, it

<sup>1</sup> Deutsch. Arch. f. klin. Med., 1913, Band ex, No. 3.

<sup>2</sup> Therapeutic Gazette, May, 1913.

<sup>3</sup> Deutsch. med. Woch., April 17, 1913.

<sup>4</sup> Metropolitan Asylums Board's Annual Report, 1912.

is well not to employ it until other methods have been tried. For this reason he confined the treatment to cases in which diphtheria bacilli had been present for more than six weeks. The earliest date on which the spray was used was the forty-sixth day, and the latest the seventieth.

The staphylococci were used in the form of a spray, and also applied by means of a swab.

Rolleston advises the method in the late stage of convalescence only, for the following reasons: (1) In the early stage, before the mucous membrane has completely regenerated, there is danger of infection of the deeper tissues by the pyogenic organisms; (2) the excess of mucus and detritus present in the throat during the acute stage presents free access of the staphylococci to the parts and affords a temporary shelter to the diphtheria bacilli; (3) in hospitals where patients, owing to the possibility of complication, especially subsequent paralysis, are detained four to six weeks, there is no need to use the method at an early stage when the chance of the bacilli being present is much greater than late in convalescence.

**Antimeningitic Serum.** The serum treatment of epidemic meningitis was introduced in 1906 by Flexner<sup>1</sup> who has recently published an analysis of 1294 cases treated from the time the serum was first introduced, up to 1912. This by no means represents the total number receiving the serum, but considers only those cases in which it was possible to obtain a satisfactory history. Flexner does not believe, however, that the results would have been essentially different even if reports of a large number had been forthcoming. As he points out, the serum has been used under all sorts of conditions, representing all known manifestations of epidemic meningitis. Hence, the test of serum treatment may be regarded as having been a rigorous one. He states that the initial difficulties surrounding the administration by direct subdural injections have been largely overcome, and doubtless will be still further simplified.

Of the 1294 cases considered in the analysis, 894 recovered, and 400 died, a mortality of 30.9 per cent. In 830, it was possible to determine the manner of termination, in 30 per cent. it was abrupt, or by crisis.

Relapses occurred in 56 of the 1294 cases, and, of this number, 40 recovered, and 10 died. A resumption of the serum treatment, often, but not invariably, served to control and suppress the reinfections. It would seem, therefore, that the relapses responded somewhat less well to the serum than the primary infections.

The analysis showed that complications and sequels were reduced in number, in fact, in this particular group, the number permanently injured was very small. Of the serious sequels, deafness is the least influenced by the serum, but, inasmuch as injury to the internal ear

<sup>1</sup> Journal of Experimental Medicine, May, 1913.

takes place early in some cases, even before the diagnosis of meningitis is made, this is hardly avoidable. Flexner hopes, however, that an early resort to the serum will eventually aid in reducing this unfortunate occurrence. Joint affections have not only been reduced in frequency, but are very amenable to direct injections of the serum. Without doubt the tendency to hydrocephalus in the young has been diminished, and the intraventricular injection of the serum has aided in several instances to abolish infection and inflammation of the cerebral ventricles, and to reestablish communication between the ventricles and the subdural space of the spinal cord. Recovery, in these cases, has been complete.

The following tables show the mortality according to the day of the injection and the age of the patient:

TABLE 1.—Mortality According to the Period of Injection of the Serum.

Period of injection.	Cases.	Recovered.	Died.	Per cent. recovered.	Per cent. died.
First to third day . . .	199	163	36	81.9	18.1
Fourth to seventh day . . .	346	252	94	72.8	27.2
Later than seventh day . . .	666	423	243	63.5	36.5
Totals . . . .	1211	838	373	69.2	30.8

TABLE 2.—Mortality According to Age.

Age.	Cases.	Recovered.	Died.	Per cent. recovered.	Per cent. died.
Under 1 year . . . .	129	65	64	50.4	49.6
1 to 2 years . . . .	87	60	27	69.0	31.0
2 to 5 years . . . .	194	139	55	71.6	28.4
5 to 10 years . . . .	218	185	33	84.9	15.1
10 to 20 years . . . .	360	254	106	70.6	29.4
Over 20 years . . . .	288	180	108	62.5	37.5
Age not given . . . .	18	11	7	61.1	38.9
Totals . . . .	1294	894	400	69.1	30.9

TABLE 3.—Mortality According to Age and Period of Injection.

Age.	Injected first to third day.				Injected fourth to seventh day.				Injected later than seventh day.			
	Cases.	Rec.	Died.	%	Cases.	Rec.	Died.	%	Cases.	Rec.	Died.	%
Under 2 years	13	12	1	7.7	37	28	9	24.3	159	81	78	49.1
2 to 5 years	30	24	6	20.0	66	49	17	25.8	93	63	30	37.3
5 to 10 years	55	49	6	10.9	69	61	8	11.6	77	61	16	20.8
10 to 20 years	67	58	9	13.4	106	73	33	31.1	171	115	56	32.7
Over 20 years	34	20	14	41.2	65	39	26	40.0	164	101	63	38.4
Totals . . . .	199	163	36	18.1	343	250	93	27.1	664	421	243	36.6

In a second article entitled, "Accidents following the Subdural Injection of the Antimeningitis Serum," Flexner<sup>1</sup> considers the untoward results which sometimes occur. These, he points out, have, after all, been small in number. Untoward results have been variously attributed

<sup>1</sup> Journal of the American Medical Association, June 21, 1913.

(1) to anaphylaxis; (2) to rapid lysis of the meningococci; (3) to excessive intracranial pressure; and (4) to poisoning by the phenol preservative sometimes present in the serum.

1. In regard to anaphylactic shock. While this does occur at times, Flexner states that it is particularly impressive and reassuring that these severe reactions, which theoretically have been so much feared, have been, on the whole, very infrequent, and, generally speaking, not fatal. Inasmuch as severe symptoms have been noted after a first injection of the serum, the question arises as to whether these have been, in all instances, examples of anaphylaxis corresponding to the severe shock occasionally follows a first subcutaneous injection of diphtheritic antitoxin. This, in Flexner's opinion, is the crucial point. From a careful study of case histories in which anaphylactic shock was supposed to have occurred, Flexner does not accept the evidence. Thus, in some instances, a severe reaction followed not on the first, but on the second or third injection of the serum, given at brief intervals. In these instances, he states anaphylactic shock can be excluded.

2. The rapid lysis of the meningococci. In producing an immunity in horses with cultures of meningococci, it has been noted that the intravenous injection of the organism which at first is well borne, later becomes a source of danger, and, if persisted in, produces such a severe effect on the animals that some of them die suddenly within a short time of the inoculation. In order to avoid this, it has been found necessary to proceed more slowly with subcutaneous injections. Dopter has explained this phenomenon on the supposition that the immune animal possesses the power of rapidly dissolving the introduced meningococci, through which lysis there is set free in such large amount of dissolved toxin that the animal dies of an acute poisoning. In support of this theory, Dopter states that he has observed that when guinea-pigs are inoculated with a mixture of meningococci and immune serum, they succumb in a short time and in a manner recalling the sudden death of horses; although this effect is not observed when a corresponding amount of the meningococcus culture is inoculated without the serum. These observations are used to support the contention that severe symptoms sometimes follow the first injection of antimeningitis serum, because the serum brings about such a rapid dissolution of meningococci within the cerebrospinal exudate as to cause an acute poisoning of the nervous system. Flexner rejects this theory, because it does not apply to the cases in which severe symptoms arose, but in which the number of meningococci within the inflammatory exudate has been very small and altogether insufficient to give rise to the soluble toxin in question, or in which the meningitis has not been caused by the meningococcus but by the pneumococcus.

3. The question of increased intracranial pressure. That a dangerous degree of increased intracranial pressure might be produced

by the subdural injection of the antimeningitis serum, Flexner states, was recognized at the inception of the serum treatment, and for this reason it was advised to inject less serum than cerebrospinal fluid removed and not to employ maximal doses. Because of the rarity of serious effects, this warning has fallen more and more into disuse until now the rule is to give far larger doses of serum than were originally employed, and often to disregard relation of dose of the serum to age of the patient. Furthermore, as Flexner points out, it was the fear of increasing the intracranial pressure that led to an improvement in administering the serum. Thus, Koplik, having in mind the possibility of increasing the pressure, advised the substitution of the gravity method for that of injection by means of a syringe. Not only does the gravity method avoid producing a sudden increase in the pressure, but it possesses the important advantage of permitting the immediate withdrawal of fluid at the first sign of any embarrassment to the function of respiration. Recently, a further safeguard has been introduced by Sophian, who has probably had the largest single experience in the personal administration of antimeningitic serum. Sophian employs the registration of the blood-pressure to supply an ocular guide to the injection of the serum by the gravity method. Practical experience has shown that the danger from increased intracranial pressure can be disregarded if the above-mentioned precautions are taken.

4. There is left for consideration the question of poisoning by the phenol preservative sometimes present in the serum. Attention was drawn to this possibility by Kramer.<sup>1</sup> According to Kramer, the phenolized serum produces symptoms of respiratory failure, and in support of this theory, he injected phenolized serum into the vertebral artery of dogs, or surrounded the exposed medulla of the dog with a solution of phenol in water, and, in each instance, obtained results analogous to those following the subdural injection of antimeningitic serum.

Flexner does not think these experiments need be regarded seriously, since no actual relationship exists between the conditions of these experiments and the conditions occurring in the subdural injection of the serum in human beings. Furthermore, as Flexner points out, no accidents should arise when a serum containing no preservative whatever is employed for subdural injections. That this is not so is evident by the fact that the serum produced in France is supplied without a preservative, and yet, in rare instances, serious symptoms, resembling those described by Kramer have followed the use of such serum. Continuing, Flexner called attention to the fact that the injection of phenolized serum into the lateral ventricle is borne quite as well as its usual injection into the lumbar meninges. Inasmuch as there does not exist a more direct path to the fourth ventricle than that of the

<sup>1</sup> Journal of the American Medical Association, May 3, 1913.

cerebral ventricles, if the mere presence of the phenolized serum within the fourth ventricle in children sufficed to bring about severe poisonous effects, we should look for such a result from the intraventricular injections. Not only has this not happened, but the later injections have proved, in several remarkable instances, to be life-saving.

The accidents, moreover, have not been limited to children, but have been observed in adults in whom a patent central canal of the spinal cord, if it exists at all, must be an extremely rare occurrence.

Flexner concludes with the following statement:

"We must not lose sight of the essential fact that in epidemic meningitis the struggle is with a highly fatal disease, and the one means now possessed to combat it is the antimeningitis serum. From this, it follows that it is not justifiable to withhold the remedy in spite of some small risk, in view of the far greater dangers to which the patients are exposed by the disease itself. Nor is it always possible to ascribe serious symptoms to the serum, even when they follow closely on the treatment. Sudden death in epidemic meningitis is a not infrequent occurrence; and cases have even been reported in which death has taken place while the physician was engaged in getting ready to make the serum injection and even before lumbar puncture had been performed. The attempt to discredit the antimeningitis serum on the basis of an unfortunate experience seems, when everything is considered, hardly defensible."

In regard to the administration of the serum, Wesson<sup>1</sup> states that the method of injection should be by gravity; the amount of fluid withdrawn bears no relation to the size of the dose of serum, which should be determined by (a) the rate of flow of the serum; (b) the amount of discomfort caused in the patient; and (c) the quantity that can be given without using pressure. The serum should be given at least once a day, and, in severe cases, every six hours. Wesson states that vigorously treated cases, if seen early, will have no bad after-effects.

**Antistaphylococcal Serum.** Thomas<sup>2</sup> describes his method of producing a potent polyvalent antistaphylococcal serum, and in addition reports the results obtained in 28 cases.

Eighteen strains of the micrococcus aureus were isolated from as many various sources and cultured on agar-agar tube slants at 37° C. for twenty-four hours. The resultant growths were washed off by the addition of 5 c.c. of bouillon to each culture, and the combined 90 c.c. shaken mechanically for fifteen minutes. Of this bacterial suspension, 0.25 c.c. were flooded on the agar-agar surface of each of two Petri dishes, presenting, respectively, an area of 12½ square inches. The growths from the two Petri-dish cultures, after an incubation at 37° C. for twenty-four hours, were washed off in 30 c.c. of sterile 0.85 per cent. sodium chloride solution. This bacterial suspension was standardized

<sup>1</sup> New York Medical Journal, April, 1913.

<sup>2</sup> Journal of the American Medical Association, April 5, 1913.

so that each cubic centimeter was estimated to contain 32,400,000,000 cocci, and then sterilized by submersion in a water-bath at 60° C. for one hour.

A full-grown, vigorous ram was selected for the purpose of immunization. After taking the animal's opsonic index, he was given an intraperitoneal injection of dead cocci. Five injections of cocci, heated at 60° C. for one hour were given. The dose ranged from 186,560,000,000 to 1,050,000,000,000. The animal being in good health it was determined to continue the immunization with living bacteria. In the next six weeks, seven intraperitoneal inoculations of unheated cocci were given, the dose ranging from 33,440,000,000 to 136,960,000,000. The opsonic index was studied before, and during, the course of immunization.

Finally, after receiving 12 inoculations (5 of heated and 7 of unheated cocci) the animal was bled to death, aseptically, from the carotid artery. The serum was separated from the clot and hermetically sealed in glass ampoules, containing 1 and 2 c.c. each.

Although Thomas had hoped to try the efficiency of the serum in cases of staphylococcic bacteriemia, he was able to treat but a single case, the remainder of the series being made up of cases of carbuncles and furuncles, many of them being of an aggravated type.

Thomas questions the propriety of the employment of active immunity with bacterins in the acute stage of an infection, whether localized or generalized, as in *furuncle* or *septicemia*, as, in his opinion, the human organism is already sufficiently stimulated by viable bacteria to the production of specific antibodies, if not completely overwhelmed, as in the case of septicemia, rendering the employment of an inactivated specific antigen inadvisable if not positively harmful.

The following three cases will serve to illustrate the results obtained:

CASE I. Feb. 8, 1910. S. S., aged fifteen years. An acute osteomyelitis of tibia, following osteotomy, developed a typical septicemia. Cultures both from the medullary cavity of the tibia at operation and subsequently from the blood demonstrated *M. aureus*. Later a suppurative arthritis of knee, demanding arthrotomy, and a suppurative inflammation of the wrist supervened. Bacterin therapy, instead of improving, probably aggravated the patient's condition. A course of hypodermic medication with mercury succinimid, strychnine sulphate, iron citrate, and arsenic trioxide converted a most desperate condition into a curable case. After an illness of ten months, inoculations with antistaphylococcic serum were instituted. During a period of four weeks, five subcutaneous brachial injections of 1, 2, 2, 1.5, and 2 c.c., respectively, of the serum were administered. The patient exhibited marked improvement, his wrist healed immediately, he was able to go about on crutches, he gained greatly in weight, all sinuses about the

knee, with a single exception, healed, and he was discharged from the hospital precisely one month later.

**CASE II.** March 11, 1910. J. P., aged twenty years. A virulent furunculosis of the head, face, neck, shoulders, and arms had existed for two or three weeks. The infection was advancing rapidly, several new boils appearing daily; patient was feverish and obviously suffering from marked toxemia. Two c.c. of antistaphylococccic serum were injected subscapularly; two days later 2 c.c. more; four days later, 3 c.c. additional, and after another interval of four days a final 3 c.c. dose. After the first inoculation no new furuncles developed, and within two weeks the patient was entirely well, even the old boils having disappeared.

**CASE III.** Dec. 3, 1910. V. C., aged nineteen years. A recurrent furunculosis of four weeks' duration began in the axilla and recently manifested itself on the back of the neck. Patient was given 2 c.c. of antistaphylococccic serum subcutaneously. Two days later patient stated that boils on neck and in axilla were practically painless; he felt much better generally than for four weeks, no new boils developed and six days after the inoculation he was discharged cured.

Thomas concludes, from this experience, that biologic therapy by a potent polyvalent antistaphylococccic serum is more effective in the presence of a staphylococccic bacteriemia than is the corresponding auto-gogenous bacteria. By virtue of the more immediate and decisive effects of the antiserum, it deserves first choice over the bacterin in the treatment of furunculosis and carbunculosis; on the other hand, a more intensive and lasting immunity can be conferred on the individual by supplementing the serum with two or three inoculations of the auto-gogenous bacterin.

**Antistreptococccic Serum.** Sexton<sup>1</sup> states that during the past four years, in the Willard Parker Hospital, *vaccination* has been performed on no less than 45,735 persons. Out of this large number, it is not surprising that many instances of infection occurred, due in every instance apparently to the introduction into the wound of some extraneous organism which produced necrosis of the tissues.

These indolent, punched-out ulcers are very obstinate in healing and do not respond at all readily to ordinary methods of treatment. Sexton reports that about three and a half years ago the local use of antistreptococccic serum was begun, and that from the very beginning a marked improvement was noted. The wound is filled with the serum, and then covered over with a dressing wet in the serum; over this is placed oiled silk in order to retain the moisture. If the dressing is allowed to dry, it becomes hard and stiff. Three or four times a day the silk is removed, and the dressing re-moistened without disturbing it. The use of other sera has not given the same results.

<sup>1</sup> Archives of Pediatrics, February, 1913.

Sexton states that, since this treatment was instituted, he has not seen a vaccinal ulcer which has not responded readily to the constant application of antistreptococcal serum used locally in the form of a wet dressing.

**Antitetanic Serum.** While tetanus antitoxin has been used extensively as a prophylactic in the prevention of *tetanus*, the results obtained from its use in individuals who actually develop the disease, have not, so far, been encouraging. Hardly without an exception the cases which have recovered under its use have been those with a long incubation period, the type of case which frequently recovers under any form of treatment.

Recent reports would seem to indicate that this judgment will have to be revised. Von Graff<sup>1</sup> reports some experimental work which clearly seems to show that, if the serum be given intravenously, it is far more efficacious than when the intraneural, subdural, or intramuscular injections are employed. Not only is the intravenous injection efficient as a prophylactic, but the experimental evidence seems to show that it may be helpful, if not curative, after the disease has developed.

Simon, quoted by von Graff, reports 6 cases of severe tetanus treated by intravenous injections; 4 of these cases recovered. Von Graff injected 15 c.c. of serum intravenously in one patient with severe tetanus. There was a distinct improvement in the symptoms, but the patient died of an intercurrent pneumonia.

Park<sup>2</sup> states that he has frequently seen the life-saving action of tetanus antitoxin, when given intravenously. Park urges surgeons to keep antitoxin on hand, and at the very first sign of tetanus, to inject, intravenously, about 20,000 units. If a smaller amount only is available at the time, give this, and a larger dose as soon as it can be obtained. Park emphasizes the importance of time. He is certain that a large intravenous dose, given within a few hours of the onset of symptoms, will save a considerable number of patients who would otherwise die. Von Graff<sup>3</sup> also urges the importance of large doses. Park states that the results are better in children than adults, probably because large amounts per body-weight can be injected. He states that the usual practice is to wait about twelve hours until the diagnosis is certain and then send for the antitoxin; thus, from twelve to eighteen hours of valuable time is lost.

Iron<sup>4</sup> also raises the question as to whether we have been right in assuming that the antitoxin is valueless as a curative agent. He believes that the question should be reopened. He would be glad to receive information in regard to cases of tetanus treated with or without antitoxin since 1906.

<sup>1</sup> Mitt. a. d. Grenzgeb. d. M. u. Chir., 1912, Band xxv, S. 1.

<sup>2</sup> Boston Medical and Surgical Journal, January 16, 1913.

<sup>3</sup> Loc. cit.

<sup>4</sup> Journal of the American Medical Association, December 7, 1913, p. 2084.

Ashhurst and John<sup>1</sup> recommend the following procedure in treating a wound suspected of harboring tetanus bacilli: (1) The surrounding skin is painted with a 3 per cent. alcoholic solution of iodine. (2) *Then all parts of the wound are made accessible*, by a wide incision if necessary. (If a punctured wound of the foot, of suspected nature, exists, it is freely opened to its depths, dividing the plantar fascia as far as necessary. If the patient lives far from the hospital and cannot return home on crutches, he is kept in the ward.) (3) The wound is mechanically cleansed by scissors and forceps, and then is thoroughly swabbed out with iodine solution. (4) The wound is lightly filled with gauze soaked in iodine solution, and is properly dressed. *Avoid all caustics*, as they kill the tissues, and the resulting sloughs, even if minute, furnish favorable sites for the growth of tetanus bacilli. At subsequent dressings (daily at first) the wound is exposed by removal of the iodine gauze, is irrigated with peroxide of hydrogen until active effervescence ceases, and is again filled with gauze soaked in the iodine solution. This method of dressing is continued until healthy granulations are formed.

Bockenheimer has concluded, from experimental work, that the best dressing for these wounds is balsam of Peru, which he believes is antibactericidal to the tetanus bacilli.

In regard to the prophylactic use of antitoxin, Ashhurst and John state that the chief objection to its use is the expense. But the worst reproach, in their opinion, that can be made against the prophylactic use of antitoxin, is that while it is harmless when carefully administered, it may be useless. That it never is useful has not been proved, and they believe that as long as a probability of its usefulness exists, it is proper to employ it in the care of suspected wounds.

In regard to the incidence of tetanus following Fourth of July injuries, and the prophylactic use of antitoxin, Ashhurst and John state "that the campaign for the use of antitoxin as a prophylactic has accomplished a marked reduction in the incidence of tetanus; that we hold that this result may be attributed as rationally to better care of the wound as to the antitoxin employed, because a physician who thinks of antitoxin, thinks also of tetanus, and the thought of possible tetanus impels him to take proper care of the wound. Moreover, in only an extremely small proportion of cases has the infection been reported."

**Apomorphine.** In those cases in which relaxation is desirable, such as croup, asthma, hysteria, hystero-epilepsy, eclampsia, and tetanus, Epting<sup>2</sup> recommends apomorphine.

Combined with a small dose of morphine and atropine, apomorphine is very efficient in *delirium tremens*. A cardiac stimulant may be combined with the above-mentioned drugs if it is thought necessary. Occasionally, when morphine fails to produce the desired hypnotic effect,

<sup>1</sup> American Journal of the Medical Sciences, June and July, 1913.

<sup>2</sup> Charlotte Medical Journal, February, 1913.

or causes nausea, the addition of  $\frac{1}{40}$  of a grain of apomorphine will produce sleep without nausea following.

When apomorphine is used as an emetic, it should be given hypodermically and whenever possible the stomach should be filled with warm water, as this will empty the stomach more thoroughly, and, at the same time, make the vomiting easier. Employed as an emetic, Epting always combines small doses of morphine (gr.  $\frac{1}{12}$ ) and atropine (gr.  $\frac{1}{300}$ ) with apomorphine (gr.  $\frac{1}{20}$ ) except in cases of opium poisoning. If the heart is weak, strychnine is also added. Used as an expectorant, Epting recommends  $\frac{1}{30}$  of a grain by mouth, frequently repeated.

**Arsenic.** Staeubli<sup>1</sup> reports two instances of idiosyncrasy to arsenic following the hypodermic administration of *sodium cacodylate*. In the first case, the second injection of 0.05 gram of sodium cacodylate was followed in twenty-four hours by a rectal temperature of 101.8° F., weakness, pain in the limbs, and a sensation of pressure in the head. The site of the injection was hot and brawny, somewhat resembling erysipelas. The symptoms passed away by the next day. Four days later the injection was repeated, and was followed by a recurrence of the untoward symptoms.

The second case developed untoward symptoms after twenty-four injections had been given on successive days. The dose, in this case, was 0.05 gram. Following the last injection, the temperature rose to 102.2° F., there were pains throughout the body, anorexia, headache, and asthmatic breathing. The site of the injection was hot and brawny, as in the first case. After an interval of some days, an injection was given at a different point, and this was followed by a local reaction alone. On two occasions later on all of the untoward symptoms recurred, although less severe than the first time.

Staeubli tested the cutaneous reaction of the drug by von Pirquet's method. The skin was scarified in three places and sodium cacodylate rubbed into one of them. Eighteen hours later the control spots showed no change, but the one to which the sodium cacodylate had been applied showed a reddened and inflamed papule 8 mm. in diameter. This increased in size during the next thirty hours, and two days later was still visible.

**Aspirin (Acetyl-Salicylic Acid).** Anderson<sup>2</sup> calls attention to the fact that aspirin may at times produce unpleasant, if not dangerous, symptoms, even in moderate doses. He, furthermore, points out that while many of the text-books contain no references to aspirin poisoning, the current literature, especially the German, records numerous instances. At times the drug produces urticarial, scarlatiniform, and pemphigus-like rashes, swelling of the eyelids and lips, edema of the skin of the head, face, and neck, as well as swelling of the mucous membranes of

<sup>1</sup> *Deutsch. med. Woch.*, December 26, 1912.

<sup>2</sup> *Canadian Practitioner*, September, 1912.

the throat and mouth. These results have followed small doses,  $7\frac{1}{2}$  grains or under. Anderson reports 2 cases in which untoward results followed the use of aspirin in 5 grain doses. Both cases developed an angioneurotic eruption.

Blackwood<sup>1</sup> states that aspirin, taken at bedtime in doses of from 5 to 10 grains, is efficient in preventing the *night cough* of tuberculous patients. From a limited experience with aspirin used for this purpose, I can, to a certain extent, confirm Blackwood's observation. The one objection I have noted is that the aspirin is apt to cause night-sweats, especially after a few nights' use. This gives the drug a rather limited field of usefulness, as it is generally the advanced case which requires a sedative for the cough, and night-sweating is also more apt to occur during this period. In spite of this, however, the drug is worth employing even if it is successful but a few times.

**Atophan.** This new preparation is highly recommended by Kahlo<sup>2</sup> in the treatment of *gout*.

Atophan is claimed to have the following formula:

2 phenyl-chinolin and 4 carboxylic acid, and is dispensed in tablet form, each tablet containing  $7\frac{1}{2}$  grains of the drug. The tablets readily disintegrate in water, but are insoluble. The dose varies from 30 to 60 grains per day. Kahlo usually prescribes one tablet after each meal and at bedtime. He has employed the drug in 48 cases, of which 43 were gout. In every case of gout in its typical form, the administration of atophan was followed by a reduction in temperature and a lessening of the pain and swelling within a very few hours, and, in practically all, by a complete subsidence of these symptoms in from twenty-four to forty-eight hours. A large majority of these patients have been treated previously with colchicum, salicylates, aspirin, etc.

The results in a few cases of *neuritis* were, for the most part, excellent, although a little less prompt and decisive than in the joint pains.

Kahlo states that he has also used atophan in a number of cases of *gouty sore throat*, and in the *coryzas*, which not uncommonly develop as a result of eliminative treatment. The results were excellent in this group of cases.

**Belladonna.** One of the most troublesome conditions to meet is that of *incontinence of urine* in children. If there can be said to be any drug which is serviceable it is belladonna. Simpton,<sup>3</sup> for purposes of treatment, divides the composition of the urine into four groups: (1) Normal urine in which the incontinence is due to weakness from some debilitating illness. (2) Extremely acid urine of a high specific gravity and often diminished in quantity. (3) Urine alkaline or neutral in reaction increased in quantity, of a low specific gravity, sometimes containing

<sup>1</sup> Journal of the American Medical Association, July 5, 1913.

<sup>2</sup> Therapeutic Gazette, December, 1912.

<sup>3</sup> Edinburgh Medical Journal, January, 1913.

a few pus cells and a trace of albumin. (4) Urine containing bacteria, most frequently the bacilli coli.

In group (1), the object is to build up the child. At the same time, it is well to begin the use of belladonna.

In group (2), the acidity of the urine must be reduced, and this is best accomplished by the use of citrate of potassium in doses of 10 grains three times daily. Wheat should be cut off from the dietary. Belladonna is used in addition.

In group (3), acid sodium phosphate is given if the urine is markedly alkaline, and, when the alkalinity has been reduced, belladonna is given. Carbohydrate foods should be prohibited as nearly as possible.

In group (4), with bacteria, citrate of potash is used if the urine is very acid, and the urotropin in 5 to 10 grain doses three times daily. If the infection is a mixed one, salol often proves efficient. Vaccines may have to be resorted to.

In giving belladonna, Simpson recommends beginning with 10 minimis of the tincture two or three times daily, and gradually increasing it to 20 or 25 minimis. If evidences of intolerance develop, such as difficulty in seeing or undue dryness of the mouth, the drug must be used cautiously. In most instances, he finds 15 minimis three times a day sufficient. The use of the drug should be persisted in for a considerable time.

Pletneff<sup>1</sup> states that the hypodermic use of *atropine* decreases the gastric secretion, diminishes the acidity, and thus relieves the pain due to spasmodic contraction of the pylorus. He administers a single dose of  $\frac{1}{60}$  of a grain once daily for as long a period as from nine days to two weeks.

The treatment is entirely symptomatic, and is only temporary in its good effects.

Although atropine often produces marked untoward symptoms sometimes of a very alarming nature, death rarely occurs, even after enormous doses. Wolter<sup>2</sup> reports 2 cases of poisoning, 1 of which was fatal. A man, aged fifty-two years, became unconscious after taking a mouthful of liquor labelled "anisette." An analysis of the liquid showed that he probably took 48 grs. (3.2 gms.). The jaws were firmly locked, the pupils widely dilated, the knee-jerks exaggerated, and the temperature high. Death occurred in twenty-seven hours. Another man who tasted two drops of the liquid had spasms of the jaws and delirium. Recovery followed after the use of chloroform and the stomach pump.

**Benzol.** A little over a year ago Koryani published his first article on the use of benzol in the treatment of *leukemia*. Since that time a number of articles have been published, most of them confirming the favorable results obtained by Koryani.

<sup>1</sup> Abstract, Journal of the American Medical Association, June 7, 1913, p. 1843.

<sup>2</sup> Arch. f. klin. Chir., Band xcix, No. 2.

The benzol may be given in gelatin capsules, prepared at the time of administration and taken shortly after meals and at bedtime. The initial dose is 7 mimims, which is gradually increased to 15 minims. Stein<sup>1</sup> recommends administering the benzol in capsules which do not dissolve until they have passed out of the stomach. Kiralyff<sup>2</sup> prescribes the benzol with equal parts of olive oil, 15 minims of the mixture to each capsule. In the beginning, 4 capsules a day are taken; the dose is increased to 2 capsules four times daily.

Billings<sup>3</sup> states that all of his patients, five in number, complained of eructations of gas tasting and smelling of benzol. Burning in the stomach was a common symptom. This symptom was also noted by Rosler.<sup>4</sup> In one instance, a patient of Billings' who had left the hospital misunderstood the directions and increased the daily dosage to 160 minims. Within a few days he developed a severe toxic erythema and pruritus of the skin of the whole trunk and extremities. Discontinuance of the drug led to the prompt disappearance of these symptoms. Wachtel<sup>5</sup> had to abandon the use of benzol in one case, as albumin appeared in the urine.

It is to be borne in mind that benzol is a powerful agent, capable of producing serious results if carelessly used. Benzol is sometimes employed as a solvent for rubber in the manufacture of a cement for sealing cans, and symptoms of poisoning occasionally develop in the working people thus employed. Selling—quoted by Billings—has reported 3 cases of benzol poisoning, 2 of which died and came to autopsy. The patients suffered from purpura hemorrhagica, aplastic anemia, and aplastic bone-marrow.

Care should be taken to see that the benzol is pure, as impure benzol contains nitro-benzol, anilin, etc., which are probably responsible for the untoward effects, such as purpura, aplastic anemia, etc. Pappenheim,<sup>6</sup> from experiments on rabbits, succeeded in injuring the kidneys and liver. Koranyi says this is explainable because of the large doses employed by Pappenheim.

While it is asserted by some that the benzol method is superior to the  $\alpha$ -rays, there are others who advocate a combination of both methods. Klein,<sup>7</sup> who has had experience with benzol in 22 cases of leukemia, is especially in favor of the combined method of treatment.

The reports are fairly consistent as to the results obtained, namely, that the number of white cells are quickly reduced; the percentage of myelocytes falls; the spleen shrinks in size in the myelogenous cases,

<sup>1</sup> Wien. klin. Woch., December 5, 1912.

<sup>2</sup> Ibid., August 22, 1912.

<sup>3</sup> Journal of the American Medical Association, February 15, 1912.

<sup>4</sup> Wien. klin. Woch., May 22, 1913.

<sup>5</sup> Deutsch. med. Woch., February 13, 1913.

<sup>6</sup> Wien. klin. Woch., January 9, 1913.

<sup>7</sup> Ibid., February 27, 1913.

and the lymph nodes in the lymphatic form, while the percentage of red cells and the hemoglobin increases. In addition, the general well-being of the patient is restored, and some have believed themselves cured. As yet it is not possible to say whether the results are permanent or not. Billings' conclusions, from 5 cases, are as follows:

"1. In two patients, a marked rise in the leukocytic count occurred for a few days. In three patients this was not observed.

"2. A rapid fall in the number of leukocytes, most marked in Cases 1, 4, and 5, in which it resulted in leukopenia.

"3. A correspondingly rapid diminution in the size of the spleen much more rapid than with  $\alpha$ -ray exposures alone.

"4. An improvement of the red-cell count and hemoglobin in all of the myelogenous types.

"5. A rapid disappearance of the small though multiple lymph nodes in the patient with lymphoid leukemia. With this patient, the hemoglobin and red-cell count remained the same during the treatment.

"6. Stained specimens of blood showed early and increasing degenerated leukocytes, especially of all mononuclear types, including the lymphocytes and myelocytes. This was manifested by basophilic granular degeneration of lymphocytes, and by deformed myelocytes containing large dark granules with the Wright stain. The polynuclear cells showed the degenerative changes, but even these showed examples of large, loose, dark granules. In fact, degenerated forms were so numerous that it was difficult, and sometimes impossible, to arrive at a leukocytic formula. The blood-picture is new and confusing.

"7. In spite of the moderately disagreeable effect of the drug on the stomach, there was a notable improvement in the general condition of all the patients. Inasmuch as  $\alpha$ -ray treatment had been applied in all but one, and was continued during the benzol treatment in all but one, the experience with these patients does not enable one to testify as to the result of benzol alone in the treatment of leukemia."

In addition to the use of benzol in leukemia, Koranyi obtained very good results in one case of *polycythemia chronica* with splenomegaly; and Klemperer and Hirschfeld<sup>1</sup> employed benzol in 3 cases of *pernicious anemia*. No benefit was noted in 2 cases in an advanced stage of the disease, but, in a third, a marked curative action was obtained, although no more striking than is generally seen from the use of arsenic. These observers, believing that large doses of benzol are dangerous, employed the drug in doses of 0.25 gram twice daily.

In spite of the favorable reports so far made, there are some who believe the treatment is unsafe and that it is furthermore based on a wrong hypothesis. The objection to its use is based on the fact that it attacks the bone-marrow, producing thereby an aplastic anemia. As leukemic patients ultimately die as the result of failure of the

<sup>1</sup> Therap. d. Gegenwart, February, 1913.

bone-marrow to manufacture red cells it would seem irrational to administer any substance which would aid in this.

**Bismuth.** From an analysis of the reported cases of bismuth poisoning, Warfield<sup>1</sup> states that there can be drawn a rather typical picture, which differs from the poisoning produced by lead or mercury. There are three stages: (1) Benign, when the violet-black hue on the gums is the only manifestation. (2) Moderately severe, characterized by the development of a stomatitis, more or less acute, and which tends to become chronic. The discoloration of the gum margins increases, and tattoo-like plaques ulcerate, secondary infections supervene, and general symptoms, as fever, hiccup, vomiting, diarrhea, and albuminuria, occur. The breath is usually very foul.

The line on the gums is usually the first symptom, but may be preceded by slight malaise and salivation, or tenderness of the gums. Occasionally, the plaques appear first. They may occur anywhere in the mouth, but show a preference for the sites where the teeth and gums come in contact. The sides of the tongue may also ulcerate.

The plaques at first are a bluish, violet-black color; in severer cases there is some swelling and a white membrane in the centre. In very severe cases, the plaques may become gangrenous.

As the poisoning grows worse, mastication becomes difficult and painful because of the severe stomatitis, salivation is marked and swallowing very distressing. The patient emaciates and frequently develops secondary infections. Vomiting, diarrhea, and nephritis may be present.

Peter<sup>2</sup> in an article on the use of bismuth in surgery and its dangers, states that death usually occurs from nervous exhaustion; accompanied by delirium, convulsions, or paralysis. The most characteristic post-mortem changes are seen in the mucous membrane of the alimentary tract, which is stained a dark green or black color; the kidneys may also be stained and congested.

Peter records four instances of poisoning in which extensive burns were treated with a bismuth ointment. One of these cases ended fatally. He cites twelve instances in which Beck's paste (30 per cent. bismuth subnitrate in vaselin) had produced symptoms of poisoning: 6 of these cases ended fatally. Peter also records 5 cases of poisoning following a "bismuth meal," and, of these, 4 ended fatally.

Peter believes that while bismuth may be retained in surgery, its use as a dressing should be restricted, and a careful watch kept for the first evidences of poisoning. As to its use in *x*-ray work, however, he maintains that it should be banished entirely, as under these circumstances the symptoms of poisoning are so sudden and severe. Peter mentions a number of substitutes for bismuth subnitrate in *x*-ray work, among them being magnetic oxide of iron, sulphide and carbonate

<sup>1</sup> American Journal of the Medical Sciences, November, 1912.

<sup>2</sup> Wien. klin. Woch., 1912, Nos. 17 to 20; British Medical Journal, June 22, 1912.

of bismuth, red oxide of iron, and oxide of thorium. The latter is very heavy, and gives an even better shadow than bismuth. It is extremely stable, and undergoes no change in the intestinal canal. An additional advantage is its whiteness and freedom from taste or smell.

Oliver and Samson<sup>1</sup> report a fatal case of bismuth poisoning resulting from the injection of Beck's bismuth paste. This patient was given the treatment because of a *persistent sinus* following *empyema*. Three weeks after the third injection, symptoms of bismuth poisoning developed, and death resulted in five weeks.

Mayer and Bache,<sup>2</sup> in a comprehensive review of the literature relating to bismuth poisoning, collected reports of 42 cases in which poisoning followed the application of bismuth salts to granulating surfaces; 13 of these proved fatal.

They believe, inasmuch as bismuth has been used for the most part in cases in which prolonged suppuration has been a feature, that it is quite likely that the kidneys have already been damaged, and that the bismuth aggravates this. If this is true, they regard the existence of a nephritis as a contra-indication to the employment of bismuth. Lanze, who is associated with Mayer and Bache, states that he has never seen a patient develop symptoms of bismuth poisoning from its employment in  $x$ -ray work. So far as they can ascertain, the untoward results arise in cases in which the bismuth was applied to granulating surfaces, or injected into cavities or sinuses.

The only exception they could find to this was a case reported by Cohen<sup>3</sup> in which oral symptoms developed after the administration of 0.3 gram of the subnitrate of bismuth four times a day for two days and a half.

Several years ago when our attention was first called to bismuth poisoning, I observed a case similar to the one reported by Cohen. In this instance, the untoward symptoms developed from the prolonged internal use of bismuth subnitrate for the control of a diarrhea. The oral symptoms were typical of bismuth poisoning, and a fatal ending resulted from a severe, acute nephritis. Owing to the fact that the bismuth was given by mouth, the editor to whom I submitted a report of this case, rejected the article on the ground that it was not clear that the bismuth had anything to do with the symptoms.

In an article on the treatment of *dysentery* due to infection with *entameba histolytica* (amebic dysentery), Deeks<sup>4</sup> advocates the following method after a preliminary dose of castor oil:

"1. Rest, in order to increase the patient's resistance and give the minimum of movement to the bowel. This is classical treatment in all acute infections.

<sup>1</sup> Lancet Clinic, October 12, 1912.

<sup>2</sup> Surgery, Gynecology, and Obstetrics, September, 1912.

<sup>3</sup> Therap. Monats., Band x, No. 8.

<sup>4</sup> Journal of the American Medical Association, January 4, 1913.

"2. A generous milk diet, because it is physiologically nutritious, admits of a minimum of intestinal putrefaction, and is practically absorbed before it reaches the large bowel, which, owing to its ulcerative condition, is more or less physiologically inert.

"3. Saline or plain water irrigations, one to three daily, purely for the purposes of lavage in order to rid the bowel of toxic products.

"4. The administration of bismuth subnitrate in heroic dosage. We give a heaped teaspoonful, equivalent to about 180 grains by weight, mechanically suspended in almost a tumbler of plain or preferably effervescent water, every three hours, night and day in severe cases, lessening the amount only when improvement takes place. The mechanical suspension in a large amount of water is essential, otherwise it is prone to form a paste, thus lessening its physiologic effect. When the stools are fewer in number and the tongue becomes clean, the number of doses is reduced to three or four daily. In very chronic cases, it is wise to continue one or two doses daily for a month after convalescence is established. The absolute milk diet is not departed from until the tongue clears, the tenderness over the bowels disappears, the lack of elasticity in the abdominal skin returns to normal, and the number of stools has been reduced to one in twenty-four or forty-eight hours. Then a normal diet may be gradually resumed as in convalescence from typhoid. We do not object to, but recommend, plain fruit-juice once or twice a day instead of the milk during the acute attack."

Untoward effects were noted in 4 of the 21 patients; 2 were suffering with diffuse nephritis and an associated acute colitis, one had a carcinomatous colitis, and 1 pernicious malaria with diarrhea. All of these patients became cyanotic, and the symptoms alarming. The symptoms of bismuth poisoning promptly disappeared after the administration of magnesium sulphate.

The following table shows the results obtained in 282 cases diagnosed as amebic dysentery, by all methods of treatment.

TABLE 4.—Total Admissions to Ancon Hospital, Cases of Amebic Dysentery, and Percentage of Deaths.

Year.	Total admissions.	Amebic dysentery.	Deaths.	Percentage of deaths.
1905	7,666	10	3	30.0
1906	13,172	55	20	36.0
1907	14,012	88	26	29.0
1908	15,378	27	5	18.0
1909	18,531	44	3	6.8
1910	20,122	37 (34)	4 (1)	10.8 (2.9)
1911	22,275	21	0	0.0

Although there have been great improvements made in the sanitary conditions of the Isthmus since the work on the Canal was begun, Deeks is of the opinion that the good results obtained during the past

few years can be attributed to the bismuth-milk-saline method of treatment.

Not only does this method of treatment give a maximum of cures with a minimum of recurrences, but it is also the most efficient method of preventing metastatic complications, especially liver abscess.

Dawson<sup>1</sup> states that of all the drugs recommended in the treatment of *gastric ulcer*, he prefers bismuth subnitrate. The bismuth is best given in powder form or cachets. While the patient is on an absolute milk diet, five grains of the bismuth may be given before each glass of milk, and continued until all discomfort in the gastric region has disappeared. Later on, it may be advisable to give the bismuth suspended in a little tragacanth, to which some chloroform water has been added, with the hope that the chloroform will tend to diminish still further the fermentation. Dawson quotes Aaron to the effect that the bismuth disintegrates slightly and liberates some of its nascent nitric acid, which acts locally as a stimulant, astringent, and antiseptic. Furthermore, the nascent nitric acid coagulates the albuminous surface of the ulcer, and thus acts as a protection to the healing. Aaron states that the bismuth should not be given with an alkali, as the latter destroys the small quantity of nascent acid developed.

Dawson advises magnesium oxide if an alkali is needed to diminish the acidity. It is far superior to sodium bicarbonate, as enormous doses of the latter are needed.

**Blood Serum.** Since the observation of Welch, made several years ago, that the injection of blood serum acted almost as a specific in the control of the bleeding which occurs in *melena neonatorum* and *hemophilia*, there has been recorded in the literature a large number of cases successfully treated.

The original discovery was empirical, and, in spite of considerable study, the cause of the bleeding in these cases is not yet clear, and still less so is the cessation of its bleeding as the result of the injection of blood serum.

Elsner and Meader,<sup>2</sup> in considering this question in its relation to chronic purpura, admit that the cause of the bleeding is still unexplainable. Various hypotheses have been advanced: Abnormal thinness of the bloodvessel walls; abnormally high blood pressure; an excessive amount of blood for the capacity of the bloodvessels; inherited predisposition to a faulty structure of the cells of the body and blood; and, lastly, defects in the mechanism of coagulation. The only theory which seems worthy of consideration is that which considers the imperfect or delayed coagulation time which is characteristic in patients suffering from one of these disorders.

Elsner and Meader incline to the belief that the beneficial effect of

<sup>1</sup> British Medical Journal, October 12, 1912.

<sup>2</sup> American Journal of the Medical Sciences, February, 1913.

blood-serum injections are dependent upon their carrying into the body cytozymes, which influence coagulation, and that the blood platelets contain this ferment, or a substance which induces coagulation.

The number of platelets normally found varies from 250,000 to 400,000 per cubic millimeter. When freshly shed blood is observed under the microscope, the platelets are seen to agglutinate, and delicate fibrils are seen to radiate from the mass. They believe, therefore, that when beneficial results follow the injection of serum, rather than the whole blood, that the serum contains fragments or disintegrated products of these platelets which contain the zymoplastic or thromboplastic substances necessary to bring about clotting.

Franz<sup>1</sup> states that there were observed in the Graz Clinic, from 1900 to 1911, 35 cases of melena neonatorum. The treatment by drugs was very unsatisfactory, the mortality being 52.9 per cent. He reports 5 cases since the introduction of serum. All of the infants recovered after an injection of 10 c.c. of serum centrifugated from blood drawn from the material stumps of the umbilical cord and kept from one to four months in dark glass, sealed vials in a dark and cool room. A few drops of chloroform were added to each vial.

The serum was warmed before using, and then injected under the skin in the thigh or buttock. No ill effects were noted, and the general condition began to improve at once.

Reichard<sup>2</sup> reports a case of melena successfully treated with normal horse serum. While human serum is to be preferred, normal horse serum can be used, and even diphtheria antitoxin may be used if human serum is not available. Perkins<sup>3</sup> used diphtheria antitoxin successfully in a hemophiliac.

Reichard's case was a typical one of hemorrhage in the newborn. Two injections of serum were needed; the first, of 15 c.c., almost stopped the bleeding from the bowel, and a second injection of 20 c.c. one day later brought about a complete cessation of the hemorrhage. Two weeks later the child was in splendid health, and had had no recurrence of the trouble.

The following instances of hemophilia treated with blood serum have been reported. Travers<sup>4</sup> is of interest because of the prompt control of the bleeding. His patient was a boy, aged five years, who belonged to a family of "bleeders." He had had several hemorrhages, which were controlled with great difficulty. The last one, which nearly proved fatal, was caused by a slight cut in his tongue, resulting from the tongue being caught between the teeth. The bleeding continued for six days, and resisted various styptics, and, in addition, several injections of horse serum. As a last resort, eight ounces of blood were drawn from

<sup>1</sup> Münch. med. Woch., December 31, 1912.

<sup>2</sup> Journal of the American Medical Association, October 26, 1912.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid., January 4, 1913.

the father's arm. The blood was then placed in an ice box for ten hours, and then 20 c.c. of the serum, thus obtained, were injected subcutaneously into the child's buttocks. Within twenty minutes a firm clot had formed on the tongue. The clot gradually grew larger for twelve hours, becoming so large that the mouth could hardly be closed. It was feared that removal of the clot would cause the bleeding to recur, but this was not the case. A second injection was given eight hours later, and a third sixteen hours later, as a measure of precaution.

Claybrook<sup>1</sup> reports a similar case of injury to the tongue in an infant, fifteen months old. Several injections of normal serum were given, but without effect. Transfusion seemed to be indicated, but was avoided, because it was feared there might be difficulty in controlling the bleeding at the point of incision, inasmuch as the original source of the bleeding came from such a small, shallow abrasion.

Perkins<sup>2</sup> case, in which diphtheria antitoxin was employed successfully in a hemophiliac, has already been noted.

Clough's<sup>3</sup> patient was a girl, aged fourteen years. At the age of eleven years she had had profuse bleeding following the removal of her tonsils and adenoids. With the beginning of the menstrual epoch, the flow lasted from ten to fifteen days. She was kept in bed and given ergot, stypticin, calcium chloride, and gelatin, but without effect. She was then given an injection of 30 c.c. of horse serum, and for the following three months the periods lasted but three days each. She was then sick for two weeks. Since the last recurrence, she has had three injections of serum obtained from her mother's blood, each one controlling the bleeding for three or four months.

Whether it will be necessary to give the injections of serum every three or four months for an indefinite period remains to be seen.

Koch and Klein<sup>4</sup> report a somewhat similar case. Their patient was a girl, aged sixteen years, whose second and third menstrual periods lasted for nearly three weeks, with, in addition, bleeding from the gums and nose. Ordinary measures failed. They then injected defibrinated blood from a normal parturient, and there was no recurrence of the bleeding. The hemoglobin, which had dropped to 20 per cent. during the hemorrhage, by the twentieth day had risen to 55 per cent., and the following menstrual period was normal.

Clowes and Busch<sup>5</sup> conclude as follows:

"1. Blood serum is found to be of considerable value in the treatment of all forms of hemorrhage due to low blood coagulability, resulting from diminished thrombin content.

<sup>1</sup> Journal of the American Medical Association, January 4, 1913.

<sup>2</sup> Loc. cit.

<sup>3</sup> Journal of the American Medical Association, July 12, 1913.

<sup>4</sup> Gynäk. Rundschau, 1912, Band vi, S. 597.

<sup>5</sup> New York Medical Journal, January 4, 1913.

"2. Human serum is in nowise superior to that of a variety of animals.

"3. Blood serum precipitated by means of a suitable mixture of acetone and ether is fully as effective as fresh serum, if not superior to it. Precipitated serum is freely soluble, and possesses the advantage over fluid serum of being sterile, always available, and retaining indefinitely its capacity to stimulate coagulation of the blood.

"4. The product obtained from horse serum appears to yield more uniformly satisfactory results than that obtained from the sera of other animals, and exerts no deleterious effects.

"5. The determination of the rapidity with which sera and solutions of precipitated sera at comparable concentrations cause coagulation of citrated blood plasma, affords a simple means of estimating the relative activity of the preparations in question, and consequently of standardizing precipitated sera for clinical purposes."

Vincent<sup>1</sup> reports eleven cases of hemorrhagic diseases of the newborn treated by means of transfusion. In every one of the eleven cases treated by transfusion, the immediate effect of the procedure was to check the bleeding and correct the anemia. The infants, in the successful cases, were apparently changed at once from sick to healthy children who slept and nursed in a normal manner.

8 of the 11 cases treated by transfusion were cured. These cured cases have been traced with but one exception. The oldest is now two years old, and all are reported to be in perfect health, with no abnormal tendency to bleed.

4 additional cases, not treated by transfusion, received injections of whole human blood. All died; in 2 the bleeding took the form of intracranial hemorrhage, and were thus beyond the hope of being saved; another died of a very rapid and profuse hemorrhage, and the fourth from a recurrence, which might have been avoided if the injections had been repeated.

Vincent, who has for the most part employed transfusion alone, is much in favor of this procedure, rather than the injection of serum or whole blood. Although several of his cases had been given animal serum ineffectually and were later cured by transfusion, it must be remembered that these cases are the exceptions. The good results obtained by Schloss and Commiskey with whole blood, and by Welch with blood serum, are sufficient evidence as to the efficiency of these measures.

**Camphor.** For many years it has been taught that the hypodermic injection of camphor, suspended in oil, is a valuable procedure when a rapid cardiac stimulant is called for, as, for instance, in sudden cardiac failure, shock, nervous collapse, and profound asthenia, such as is encountered sometimes in typhoid fever. Aside from the fact that it

<sup>1</sup> Archives of Pediatrics, December, 1912.

has been noted by competent observers that camphor is a rapid cardiac stimulant, nothing is known as to how it acts.

Heard and Brooks<sup>1</sup> have contributed a clinical and experimental paper on the action of camphor. Their results are at variance with what has been accepted as a well-established clinical fact. They conclude that the drug exercises a favorable effect upon the heart muscle, when it is poisoned by chloral, muscarine, or strychnine, but that it should never be relied upon as a cardiac stimulant. They also assert that it need not be feared as a toxic agent.

Hare,<sup>2</sup> in commenting on the conclusions of Heard and Brooks, states that it is worth while noting that, in most of the instances in which they employed camphor, the patients were suffering from ruptured compensation in valvular disease of the heart. In Hare's opinion, this type of cardiac failure is least suited to camphor, and he, himself, has rarely employed it in these cases. Hare's final comment in regard to the use of camphor as a cardiac stimulant is that while we may not be able to explain satisfactorily why it does good, the fact that such is the case is a well established one, if the drug is employed in the proper sort of cases.

Fornaca and Lanza,<sup>3</sup> from an experimental and clinical study of the effects of camphor, found that while it has no antitoxic or bactericidal properties, it does stimulate the heart. It also has a prompt and pronounced effect in raising the blood pressure when given in doses of not over 0.2 to 0.4 gm. in 1 to 2 c.c. of olive oil. The action grows less as the dose is increased beyond this. The desirability of employing small doses (not over 2 grains) is emphasized by Hare,<sup>4</sup> who also states that each succeeding dose seems to lose some of its efficiency. In this connection it is interesting to note that Heard and Brooks<sup>5</sup> obtained no definite effects from a dose as large as 50 grains.

Vignard and Arnand<sup>6</sup> advocate intra-abdominal injections of 1 per cent. solutions of camphorated oil. The solution is prepared by shaking a kilogram of the oil with 300 grams of 95 per cent. alcohol. After twenty-four hours it is decanted, and this process is repeated three times. The traces of alcohol remaining are evaporated on a sand-bath, and then the oil is sterilized by nine hours' heating, camphor in proper quantity having been added, and the contained vessel having been carefully sealed to prevent volatilization. From 200 to 300 c.c. are injected into the peritoneal cavity. The effect of the oil is to lessen or prevent peritoneal absorption and adhesions. Furthermore, the camphorated oil exerts a stimulating effect upon the heart and blood

<sup>1</sup> American Journal of the Medical Sciences, February, 1913.

<sup>2</sup> Therapeutic Gazette, April, 1913.

<sup>3</sup> Riforma Medica, December 14, 1912; Journal of the American Medical Association, January 25, 1913.

<sup>4</sup> Loc. cit.

<sup>5</sup> Loc. cit.

<sup>6</sup> Revue de Chirurgie, May, 1912.

pressure, stops vomiting and reestablishes peristalsis. They have not noted any toxic effects from the camphor. In addition to the intra-abdominal injection, they employ proctoclysis and the Fowler position.

Koppang<sup>1</sup> reports a non-fatal case of poisoning in a young man who took 1.2 gm. of pure camphor for insomnia. Koppang reviews other recorded cases of camphor poisoning. The smallest dose causing symptoms was 0.7 gm. The lethal dose for adults is not known; as much as 15 gm. has been taken with suicidal intent with recovery. On the other hand, children have succumbed to a dose of from 0.75 to 1 gm.

**Chemotherapy.** Because of the brilliant results obtained with salvarsan, laboratory workers, for the time being at least, are devoting more and more attention to the study of chemical substances in the treatment of disease. This field of therapeutic endeavor, which Ehrlich has termed chemotherapy, is not by any means new. As Ehrlich points out, the results obtained in the immunization and cure of disease by means of animal sera are but the forerunners of what he believes may be expected in the future from the use of chemical substances.

The reproach of therapeutic procedures has always been that they are too often empirical, and while many drugs have produced good results in spite of our not knowing why they did good, the reproach has remained. It is encouraging, therefore, to learn from Ehrlich that he believes it is only by empiricism that we will make any advance in chemotherapy. It will be necessary in the case of each disease to try a variety of agents, and many combinations of the same agent in order to obtain the needed remedy. In some instances the clue will be furnished by the fact that some drug is believed to act favorably in a certain disease or diseases. An example of this is furnished in the use of quinine in the treatment of pneumonia, mention of which will be made later. For the most part, however, repeated experimentation with various agents promises the best results. And if one is inclined to scoff at the hopelessness of such a task, he need only recall the 606 trials that finally produced salvarsan.

The literature on chemotherapy has grown to such huge proportions, that it is possible to give only a glance at the nature of the work now being done. As yet the results reported are almost entirely of an experimental nature, and no definite results so far forthcoming.

A little over a year ago, Paul A. Lewis<sup>2</sup> published a preliminary note on the *action of certain of the aniline dyes on tubercles*.

Recently, in association with his assistant, Mr. Krauss, he reported some further observations along the same lines, before the American Society of Pharmacology and Experimental Therapeutics.

In his first communication, Lewis gave the results obtained with

<sup>1</sup> Abstract, Journal of the American Medical Association, January 25, 1913.

<sup>2</sup> Journal of the American Medical Association, 1912.

trypan red, which, it will be recalled, was one of the substances originally employed against trypanosome infections, and isamin blue. In these experiments he found that the trypan red had to a high degree the property of penetrating to the centre of the tubercle, staining the caseous portion a bright pink color, while it affected the peripheral cells hardly at all; the isamin blue, on the other hand, stained the caseous cells very faintly, but stained the peripheral cells of the tubercle very markedly.

The recently reported work of Lewis and Krauss deal with modifications of the trypan red made with the idea of utilizing this substance to carry into the tubercle agents which might destroy the tubercle bacilli. The trypan red was, therefore, combined with iodine, thymol, eucalyptol, guaiacol, and iodoform. These combinations apparently did not increase the penetrating power of the trypan red, nor did they exert any appreciable influence on the tubercles. While they have formed some combination which seemed to inhibit tubercle formation, these substances, when injected into infected animals, failed to check the disease.

De Witt<sup>1</sup> reports of observations along similar lines. She employed a number of the anilin dyes, among them being trypan blue and red, isamin blue, pyrol blue, and various methylene blues.

Guinea-pigs, previously inoculated with tubercle bacilli, were used in all cases. With the trypan blue, in nearly every instance, the smaller tubercles of the lungs, liver, and spleen took the stain, the tubercles contrasting sharply with the surrounding tissue, which is either unstained or only faintly so. The large, caseous, and softened lymph nodes always showed a blue periphery, and, if the injections had been repeated a number of times, the caseous and softened centres also stained a deep blue, and frequently blue pus exuded from the tubercle for some weeks prior to death. Distinctly stained tubercle bacilli were never noted, although at times deeply blue-stained granules were noted. It cannot be said, however, that the staining of tubercle bacilli with trypan blue is a certainty.

I have already alluded to the fact that the clue to a possibly suitable agent is sometimes furnished by the previous empirical use of a drug. Rosenthal<sup>2</sup> in a review of the *drug treatment of pneumonia* points out the large number of drugs which have been employed in the treatment of this disease. The only drug which has retained a standing in the management of pneumonia is *quinine*, which was first introduced many years ago by Jurgenson. Quinine has been discarded repeatedly, and as often revived; at the present time it is being lauded by Cohen.

Acting on this empirical suggestion, Morgenroth and his associates have attempted to utilize quinine in the treatment of pneumococceic

<sup>1</sup> Journal of Infectious Diseases, January, 1913.

<sup>2</sup> Zeitschr. f. Chemo., 1912, S. 1149.

infections, according to the principles of chemotherapy. They found that quinine itself was quite ineffective in mice infected with pneumococci, as was also hydroquinin, but that certain modifications of the quinine formula did produce striking results. A propyl derivative of quinine possessed considerable activity, and even more so the ethylhydrocuprein.

The ethylhydrocuprein derivative has been employed in 21 cases of pneumonia, and in 3 of them an amblyopia, severe but transient in character, developed. While this work cannot be said to have as yet passed the experimental stage, and is still too uncertain to admit of general use in human beings, it is, to say the least, extremely encouraging.

Loeb<sup>1</sup> has reported some interesting observations on the use of *colloidal copper in cancerous conditions*. Recently, Loeb and Fleisher<sup>2</sup> published a preliminary note on the *intravenous injection of casein in cancer*. A complete report of the effects of colloidal copper and casein in cancer is promised for the near future.

This brief account of the new activities in therapeutic endeavor are sufficient, I believe, to indicate the method of approaching the problem, and also serves to show that there is every reason to believe that success is sure to attend the effort of some of the workers in this field.

**Chenopodium.** In a comparative study of the effects of oil of chenopodium, thymol, naphthol, and other vermifuges, Schüffner and Verwoort<sup>3</sup> state that the oil of chenopodium surpasses the others in the treatment of *hookworm disease*. They have given the oil of chenopodium a thorough trial in 1457 cases. In addition to expelling the hookworms, it also acts on the ascarides.

These doses of the drug are given at two-hour intervals, 16 drops to the dose. Two hours after the last dose, castor oil (17 grams) and chloroform (3 grams) are administered.

**Cod-Liver Oil.** Although cod-liver oil has practically disappeared from the treatment of *tuberculosis*, there can be no doubt that in its day it did produce excellent results. For many years the good effects of the oil was attributed to the iodine content. Now it is pretty generally conceded that it did good, because of its ready absorability, and that it was as a tissue builder that it brought about improvement. Williams<sup>4</sup> in a comparison of the results obtained under cod-liver oil and the more modern methods, fails to find any very striking advance in the treatment of the disease. In an examination of the various cod-liver oils on the market, Williams came to the conclusion that the presence of small quantities of iodine, phosphorus, and various other

<sup>1</sup> Interstate Medical Journal, 1912.

<sup>2</sup> Journal of the American Medical Association, June 14, 1913.

<sup>3</sup> Münch. med. Woch., January 21, 1913.

<sup>4</sup> Lancet, August 3, 1913.

bodies in the oil was due to decomposition. He concludes, therefore, that the therapeutic effect of the oil was largely due to the unsaturated fatty acids it contained, and not to the impurities referred to.

The present attitude of phthisio-therapeutists toward cod-liver oil is that the oil is an unpleasant dose, is badly borne by many, and, furthermore, that fats, in a more attractive form, are available.

Another condition in which cod-liver oil was once very popular is *marasmus*. Gray<sup>1</sup> states that the oil was advised in children below par as the result of a severe or prolonged illness, or who, because of errors in digestion, could not be built up by the most carefully adjusted diet; another indication was in infants whose digestion was at fault, and, finally, that infants who could not digest the smallest amount of fat in ordinary food would utilize small doses of this fat. The ready absorption of cod-liver oil is due to the fact that the fat-globules of this oil are taken up without a previous splitting into fatty acids.

Instead of rubbing the oil into the skin, Gray advises the following procedure: The child is wrapped in oil-soaked flannel, extending from the arm pits to the iliac crests. Over this is placed oiled silk. Every twelve hours the flannel is removed and the skin washed with soap and water. During this time the skin is constantly bathed in oil. That the skin readily takes up the oil was shown by the fact that from 30 to 50 per cent. of it, by weight, disappears. This was determined by weighing the oil-soaked flannel before applying and again on removal, together with the oil scraped from the skin, an allowance of 10 per cent. being made for that which the scraping does not remove. The child is given nothing by mouth, except water in sufficient quantities to supply the vessels and tissues abundantly, and to aid the kidneys to do the extra work required by the shutting off of so much skin.

The first effect of the treatment is a rise in temperature, which in some cases occurs quickly, and in others slowly. Following the rise in temperature, but not at once, the evidences of an increase in fat and water content appear. The skin begins to lose its dryness, wrinkles disappear, and the old appearance begins to disappear. This is followed, at variable intervals, by a gain in weight.

The return to feeding by mouth will have to be determined in each case; no attempt should be made in this direction, however, until the temperature has become normal and the skin shows a considerable increase in the fat and water content. The length of time of continuing the oil has varied, in Gray's experience, from one week to two and a half months.

In an experience covering a period of twenty-five years, Gray reports the following results: 36 premature infants, 30 saved, 83 per cent.; congenital marasmus, non-syphilitic or tuberculous, 52, 100 per cent. recoveries; acquired marasmus, 220, of which 206 recovered, 93 per cent.

<sup>1</sup> Journal of the Medical Society of the State of New Jersey, January, 1913.

Gray characterizes the treatment as "a dirty, bad-smelling one, destructive of clothing, but the mother of the little old man or woman, on lap or pillow, will forgive the dirt, the smell, the destroyed clothing, when, after a shorter or longer time, she holds in her arms the robust and rollicking baby."

**Diastase.** Good results have been reported from the use of diastase in the treatment of *diabetes mellitus*. Williams and Powell<sup>1</sup> have given it a trial, but with negative results.

**Diet.** About fifteen years ago, H. A. Hare published a paper in which he advocated a more liberal diet in the management of *typhoid fever* patients, and since that time he has repeatedly emphasized this point in editorial articles.<sup>2</sup> The number who believe that a high caloric diet is preferable to an exclusive milk or milk and gruel diet has, in the meantime, steadily increased. The milk diet was not prompted by the fact that nutrition could be satisfactorily maintained during the febrile attack, but because it was felt that the food should be of a character that was easily assimilated, and, at the same time, would not render the patient liable to intestinal perforation. Then, too, there was a widespread belief that the digestive functions were so impaired that food, other than milk, was not readily digested.

Inasmuch as typhoid fever is characterized by marked emaciation due to increased tissue combustion, it is more than reasonable, from a physiological point of view, to prevent this loss of body weight by supplying an adequate amount of food. Opposed to this has been the long-standing prejudice that anything but milk was harmful, if not actually dangerous.

Shaffer and Coleman<sup>3</sup> have contributed a splendid study on the subject of a high caloric diet in typhoid. They have employed a diet consisting of a quart of milk, a pint of cream (20 per cent.), three to six ounces of milk-sugar, two or three eggs, toast, butter, cereals, potatoes, custards and apple sauce.

Du Bois<sup>4</sup> has made an excellent study of the results of food utilization in a series of patients maintained on the dietary above mentioned. He found that the stools of patients maintained on this diet resembled normal stools, and that there was no evidence of any irritation of the intestinal tract attributable to the diet. Furthermore, the indican excretion in the urine compared favorably with what is observed in normal individuals. His studies also showed that carbohydrates, up to 10 ounces a day, are absorbed as readily by the fever patient as by a normal individual, and the same was true for proteins. They also absorb large amounts of fats, although it is worthy of notice that fat

<sup>1</sup> Quarterly Journal of Medicine, October, 1912.

<sup>2</sup> Therapeutic Gazette.

<sup>3</sup> American Journal of the Medical Sciences, 1912, vol. exliii, p. 77.

<sup>4</sup> Archives of Internal Medicine, September, 1912.

absorption is not as well performed in the earlier stages of the disease as in the third and fourth weeks.

Another interesting study on this subject has been contributed by Graham and Poulton<sup>1</sup> entitled, "The Influence of Febrile Temperatures on Protein Metabolism." They point out that high temperature itself will cause a destruction of the body proteids and an increased energy production, with the result that, in the absence of sufficient nitrogen-free substances, the proteins of the body are called upon to take a share in this production. They conclude that if a diet of ample caloric value is taken, which contains practically no carbohydrates but a large excess of protein, the fat metabolism is increased, and probably protein metabolism also takes a small share in the increased energy production set up by the high temperature. If a diet of very high caloric value is taken, which contains a large excess of carbohydrate, but a nominal quantity of protein, non-nitrogenous substances supply the increased energy production set up by the high temperature.

Sicard<sup>2</sup> endorses a high caloric diet in the treatment of typhoid fever, employing for this purpose milk and carbohydrates. Carbohydrates are supplied in the form of milk-sugar, cereals, bread, toast, crackers, and baked or mashed potatoes. Fats are best given in the form of cream, butter, and cocoa.

In order to maintain the proteid equilibrium, milk, eggs, and protein containing carbohydrates are given. The quantity of food given will depend on the requirements of the individual case, each being given as much as can be digested easily.

Vomiting seldom proves a contra-indication to the feeding of high full values. If any particular article of diet proves to be distasteful to the patient, it can be stopped; if vomiting continues, the diet should be discontinued until the stomach has quieted down. Diarrhea is not common; when it does occur, an excess of fat is not infrequently the cause. Distention may be caused by too much milk-sugar.

Sicard's experience with a high caloric diet have convinced him that patients so fed have a cleaner and moister tongue, less offensive breath, less emaciation, a cleaner and healthier skin, and less diarrhea. Then, too, there is less nervous exhaustion, the patient being less liable to the continuous, muttering delirium and constant picking of the bedclothes, so frequently seen in typhoid fever patients.

There are also fewer complications, the tendency to relapse is not increased, and the mortality rate is probably reduced.

Sicard states that the most evident features of high caloric feeding are the maintenance of weight and nutrition, the amelioration of hunger, and the lessened tedium of convalescence. The loss of weight will depend, to a great extent, on the amount of food taken. Under

<sup>1</sup> Quarterly Journal of Medicine, 1913.

<sup>2</sup> Medical Record, March 22, 1913.

the old method, patients lost from 15 to 25 pounds during the illness; while under present methods the loss is rarely more than 10 pounds. In moderately severe cases, the loss is slight, and, in some instances, patients will even gain weight.

Johnson and Watt<sup>1</sup> report on the results obtained in 65 cases of typhoid fever in which milk was absolutely eliminated. They employed broths, soups, gruels, gelatin, eggs, sugar of milk, and butter. They especially recommend gelatin, of which 1.5 ounce is added to a quart of water, flavored with lemon, vanilla, or sherry, and sweetened with sugar of milk. The gelatin solution is administered in divided doses between feedings. The gelatin is omitted if venous thrombosis occurs. The gruels, consisting of rice, barley, or oatmeal, beginning with a thin preparation and gradually thickening it, if well borne.

The gruel is prepared by adding a tablespoonful of rice, oatmeal, or Robinson's barley flour to a pint of water, boiling it for three-quarters of an hour, and then strain. For thick gruel, use two tablespoonfuls. For adults, add the yolks of four eggs and 4 drams of milk-sugar; for children, the yolks of two eggs and 2 drams of milk-sugar.

During convalescence, the same diet is used until the tenth day, and then two soft-boiled eggs are allowed. Milk toast is then added, and by the end of another week a full soft diet is permitted.

*The Dietary Management of Cardiovascular Disease* is receiving more and more attention. As our knowledge of the phenomena which attends alterations in the arterial tension grows, it becomes increasingly apparent that in the high-tension cases the action is largely a compensatory one. While drugs are valuable adjuvants for the temporary control of sudden symptoms, we must rely on other measures if we expect to prevent the trouble from progressing with undue rapidity.

Supervision of the diet is of the first importance in high-tension cases, and, according to Hecht,<sup>2</sup> it must be so regulated as to restrict the intake of meat, fluids in general, alcohol, salt, and condiments. Hecht advises the free use of vegetables which should be served in the water in which they are cooked. He also states that physical and mental repose are absolutely essential in these cases, although, later, mild forms of exercise may be permitted.

The non-stimulating diet advised by Hecht is of itself an aid in curbing the excessive appetite with which many of these high-tension cases are afflicted, and, in this way, overindulgence at the table is more easily controlled.

Cornwall<sup>3</sup> states that the use of an antiputrefactive diet in cases of high tension is an efficient method of determining whether there is

<sup>1</sup> New York Medical Journal, February 1, 1913.

<sup>2</sup> Zeitschr. f. klin. Med., August 31, 1912.

<sup>3</sup> Archives of Diagnosis, July, 1912.

associated any considerable amount of chronic nephritis or arteriosclerosis. If, under such a diet, the tension returns to normal, or nearly so, and remains there, nephritis or sclerosis of the vessels can be excluded. If, on the other hand, the blood-pressure is not materially reduced, it can be assumed that advanced nephritis is present or that there is sclerosis of arteries supplying regions of the body which are of vital importance.

Vaquez<sup>1</sup> is a strong advocate of the dietetic management of heart cases. As we can now fairly accurately determine the exact articles of food which the particular case can or cannot properly eliminate, Vaquez believes our dietary advice should be based on studies of this sort and not given haphazardly.

Shoonmaker<sup>2</sup> states that diet is most important in cases with imperfect cardiac compensation, yet with sufficient myocardial reserve to permit of limited activity. Their endurance, however, is always limited; so they are frequently, perhaps daily, near the borderline where cardiac overstrain begins. For them we must supply sufficient food, which, when converted into energy, will be equal to that needed by a healthy person of the same type, doing the same amount of work. If the patient's digestion were normal, this would be an easy task, but, as his digestion is not normal, pains must be taken to adopt his diet to his digestive powers.

In estimating the energy that a given day's rations should furnish, a convenient method is to determine its caloric value; but it must be borne in mind that caloric value and nutritive value are not synonymous. A food may be rich in calories, yet require so much energy for its digestion and assimilation that the residue has a very small nutritive value. If, however, we provide a well-balanced, easily digestible daily ration, prepared and served so that digestion need not wait upon a good appetite, we can at the same time, with convenience and profit, measure the quantity by its caloric value.

The following is a specimen diet, marked out on this basis and used at the Clifton Springs Sanatorium:

Breakfast					Grams.	Calories.
14.0	Oatmeal	.	.	.	88	360.0
0.8	Grapefruit	.	.	.	175	70.0
3.0	Toast	.	.	.	34	90.8
1.8	Cream	.	.	.	72	129.6
	Sugar	.	.	.	15	61.5
0.1	Butter	.	.	.	11	84.0

*Lunch, 11 o'clock*

28.6	Seven ounces of milk	.	.	.	212	150.0
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<sup>1</sup> Archives des Maladies du Coeur, April, 1913.

<sup>2</sup> Clifton Medical Bulletin, April, 1913.

<i>Dinner</i>					
13.0	Roast beef	.	.	.	68
19.0	Boiled rice	.	.	.	58
0.7	Tomatoes	.	.	.	64
0.4	Celery	.	.	.	52
1.0	Orange	.	.	.	168
<i>Lunch, 4 o'clock</i>					
16.9	Seven ounces of cocoa	.	.	.	121.1
<i>Supper</i>					
5.5	One egg	.	.	.	42
4.6	Bread	.	.	.	47
	Butter	.	.	.	11
	Salad { lettuce	.	.	.	40
	oil	.	.	.	8
2.1	Cake	.	.	.	34
	Pineapple	.	.	.	71
111.5	Total for twenty-four hours	.	.	.	2683.8

In the treatment of *chronic nephritis*, Goodall<sup>1</sup> advises a protein-free diet for from five to ten days. During this period the accumulated end-products of protein metabolism are eliminated, nitrogen content of the blood falls to normal, and the heart and kidneys are given a rest. Following the restriction period, a low protein diet may be resumed for a considerable time without a return of disagreeable symptoms.

Goodall gives a protein-free diet for from five to ten days, depending on the severity of the case. Then, protein, not exceeding 60 gms., is added and maintained until such a time as the patient can stand a further increase up to 90 or 100 gms. If, however, there is evidence of a re-accumulation of end-products, the protein-free diet is resumed. The protein-free diet may be repeated every six or eight weeks. Goodall advises that the diet be controlled by urinary nitrogen estimations.

Perhaps in no serious chronic diseases have greater advances been made than in the management of *diabetes*; and this has been accomplished almost entirely by dietetic measures.

Lépine<sup>2</sup> asserts that the mortality in diabetes is not keeping pace with the morbidity, because of our increased knowledge as to the phenomena of the disease, and the consequent improvement in its management.

Where formerly carbohydrates were rigidly excluded, it is now recognized that some carbohydrate food is needed if we are to avert the greatest menace to the diabetic, namely, acidosis and coma. Of still more recent knowledge is the recognition that some carbohydrate retention is necessary in order to aid in the combination of fats.

Von Noorden<sup>3</sup> states that failure frequently occurs, in the treatment

<sup>1</sup> Boston Medical and Surgical Journal, May 22, 1913.

<sup>2</sup> Berl. klin. Woch., 1913, Band 1, S. 477.

<sup>3</sup> Med. Klin., April 20, 1913.

of diabetes, because the disease is allowed to progress beyond its early stage. He insists that treatment must be started early, as this is the time when, according to the patient's regulation of his diet, all may be won, or all may be lost.

Joslin<sup>1</sup> has reported 8 cases in which health has been maintained by means of a carefully regulated diet for a long period of time, ten years and even longer. These cases were reported in order to illustrate how sugar may be removed from the urine, provided weight and strength can be maintained. The procedure is as follows: A diet containing 100 to 150 grams of carbohydrates was given at the start and gradually reduced until sugar failed to appear in the urine. The preliminary diet was as follows: Meat, limited to 300 grams; 3 eggs; vegetables; cream, 250 c.c. ( $\frac{1}{2}$  pint); oranges or grapefruit; oatmeal, 36 grams; bread, made with water and without sugar, 100 grams; milk, 500 c.c. Vegetable days were frequently employed, and, occasionally, oatmeal days.

When acidosis was present, sodium bicarbonate or sodium citrate was administered in daily doses of from 12 to 24 grams.

At present, Joslin recommends a restricted diet one day a week, and gradually to increase the carbohydrates on the other days up to 70 grams daily. This cycle is repeated weekly. Disque<sup>2</sup> employs a vegetable day once or twice a week. He prefers the purin-free vegetables and fruits. Green vegetables and salads are freely allowed (spinach, peas, and beans are not given because they contain purins). As beverages, he allows tea or lemonade with saccharin.

Strauss<sup>3</sup> states that, in some cases of *diabetes insipidus*, the polyuria may be reduced by a salt-free diet. If this fails, the amount of fluid taken should be restricted. Thirst can be minimized by fruits, sipping a little lemonade or carbonated water, or rinsing the mouth with cold water. The protein intake should be reduced to 60 to 70 grams daily. If a functional neurosis or arteriosclerosis is present, meat had better be excluded from the diet.

The *tuberculosis* problem is becoming more and more a problem of protecting children. Inasmuch as the sources of infection are so numerous and widespread, it is inevitable that most children receive an implantation early in life. This does not mean that all of these children eventually develop tuberculosis, however, something else is evidently necessary. In some cases, for instance, it may be an acute illness which lowers the resistance and enables the tuberculous infection to gain headway; in others, poor hygiene or poor food may be the exciting causes. Czerny<sup>4</sup> points out that in most children there is a

<sup>1</sup> American Journal of the Medical Sciences, April, 1913.

<sup>2</sup> Therap. Monats., October, 1912.

<sup>3</sup> Deutsch. med. Woch., October 17, 1913.

<sup>4</sup> Med. Klin., June 1, 1913.

certain degree of immunity against infections, and that this can be enhanced or reduced by diet. This he illustrates by citing the fact that a healthy infant does not develop thrush, even if its mouth is inoculated with oidium; but if gastro-intestinal disturbances arise, the oidium starts up the thrush at once. As soon as the digestive disturbance is corrected, the infection subsides even without the employment of any local treatment. As the child grows older, the natural immunity increases, and the oidium does not excite an attack of thrush except in much debilitated children.

Vogt<sup>1</sup> believes that a proper diet for children is one of our strongest aids in providing an efficient prophylaxis against tuberculosis.

Kendall<sup>2</sup> emphasizes several important points in the feeding of tuberculous patients. Forced feeding is not essential as a routine measure, and great gains in weight are not necessary, the endeavor being to obtain a gradual gain up to or slightly above what the normal for the particular individual should be. It is hardship, as Kendall points out, to advise patients to procure food, the price of which is almost prohibitive, when a diet of an equal or greater nutritive value can be purchased for less money.

An excellent article, illustrating this last-mentioned phase of the dietetic management of tuberculosis, has been contributed by Miss Cecilia Flick,<sup>3</sup> "Class Visitor" at the Phipps Institute.

The following dietaries illustrate the lack of knowledge possessed by the lower classes in regard to the selection of foodstuffs:

"CASE I. A family of seven: Breakfast—Bread, one pint of milk, coffee. Dinner—Barley soup and one pound of meat. The soup was made of the broth of the meat, two potatoes and two cents' worth of barley. Supper—Coffee, bread, and five cents' worth of sardines.

"Same family on another day: Breakfast—One dozen cinnamon buns, coffee, one pint of milk. Dinner—Vegetable soup, one pound of meat. Supper—Coffee and bread.

"CASE II. A family of eight: Breakfast—One-half loaf of bread, coffee, one quart of milk. Dinner—One half loaf of bread, soup made of one pound of meat, one-half pound of beans, one pound of rice, and one head of cabbage. Supper—Bread, herring, and tea.

"CASE III. A family of seven: Breakfast—One loaf of bread, coffee, sugar and milk to the amount of six cents. Dinner—Two pounds of lima beans dressed with hot lard, one loaf of bread. Supper—One loaf of bread, tea, one dozen bananas.

"CASE IV. A family of four: Breakfast—Four glasses of cocoa made with water and one-half pint of milk, bread. Dinner—Two eggs, five cents' worth of herring, bread. Supper—Rye bread and tea."

<sup>1</sup> Therap. Monats., August, 1912.

<sup>2</sup> Canadian Medical Association Journal, August, 1912.

<sup>3</sup> Journal of the Outdoor Life, July, 1913.

Contrasted with these are the following menus taken from the diaries of class patients who made excellent gains in weight:

“CASE I. Breakfast—Fruit, milk, cereal, two eggs, bread and butter. Dinner—Lamb chops, potatoes, corn, bread, butter, milk and fruit. Supper—Sliced tomatoes, bread, butter, milk and fruit.

“CASE II. Breakfast—Oatmeal, milk, two raw eggs. Dinner—Soup, roast lamb, potatoes, bread, butter, fruit and milk. Supper—Cold roast lamb, bread, butter, potatoes, fruit and milk.

“CASE III. (An Italian). Breakfast—Oatmeal and milk. Dinner—Macaroni with butter, fruit, bread and butter and milk. Supper—Beefsteak, greens, bread and butter and milk.

“CASE IV. Breakfast—Oatmeal, cream, bread and butter and milk. Dinner—Beefsteak, lima beans, potatoes, bread, butter, and milk. Supper—Vegetable soup, roast beef, potatoes, bread, butter, stewed prunes, and milk.

As the writer points out, our greatest difficulty is in handling the very poor. And yet satisfactory results are attainable if sufficient time and study are given to the needs and limitations of each family. “Take, for instance, a family of five: a father, mother, and three children between the ages of one and one-half and ten years, with an average income of \$9 a week. The father, who is the wage-earner, is a moderately advanced case of tuberculosis. What is the solution of this problem?

“The family must be properly housed, and three rooms are the least that they should occupy. They must have light, heat, clothing, and a good, nutritious diet. The lowest possible estimate of the first three items are:

Rent per week . . . . .	\$2.00
Fuel for light and heat . . . . .	.93
Clothing . . . . .	1.50
Incidentals, including carfare for father . . . . .	1.00
 Total . . . . .	 \$5.43

This leaves a balance of \$3.57 for food, not a very large amount of money to feed four people, excluding the baby. Yet \$9 or \$10 dollars a week is the average income among the poor, and this is the average-sized family. In one particular case it was found that \$7 dollars a week was necessary to maintain a normal standard of nutrition for the patient and family; the patient requiring two quarts of milk and four teaspoonfuls of olive oil a day in addition to the family diet. The diet of the patient was as follows:

“Breakfast—A large bowl of oatmeal, one pint of milk, and two raw eggs. Dinner—One-half pound of beef, about four ounces of bread, butter, one apple, and one pint of milk. Supper—Soup, one-half pound of beef, a sour tomato, about four ounces of bread, potatoes, butter, and one pint of milk. 8.45 P.M.—One pint of milk.

"Two teaspoonfuls of the olive oil are taken in the morning just before going to work and two after the last milk at night. It is preferred to have patients take a part of the milk at intervals during the day, which will not interfere with their appetite for their meals. This is not always possible, however, when people are working. This man has maintained his weight between 150 and 154 pounds for the past two years, working every day in a factory."

Finally, in dealing with those of foreign birth, it has been our policy at the Phipps Institute to adopt our diet, as nearly as possible, to what each nationality is in the habit of eating.

**Digitalis.** Each year the literature contains numerous references to digitalis. And while in many instances time-worn truths are repeated over and over again, the very fact that this occurs is an indication that the writers of the articles, from personal observation, have felt the need of reëmphasizing certain features of the use of the drug. Fussell<sup>1</sup> states that while the drug is one of the most useful, it is at the same time the least to be depended upon of any drug in the *Pharmacopœia*. This is due to the fact that the drug does not keep well; the tincture should not be over a year old, and if the infusion is employed, it should always be freshly prepared. In recent years, digitalis preparations have been more uniform in their action, because the better of the drug houses test their preparations.

Hatcher and Eggleston,<sup>2</sup> in a review of the question of the deterioration of digitalis preparations, take a more optimistic view of their keeping properties. They conclude that deterioration depends to a great extent on the method of preparation. If liquid preparations contain less than 50 per cent. of alcohol (the official strength) they are probably not good. Even when properly made, tinctures will rapidly deteriorate if diluted with water, and, for this reason, Hatcher and Eggleston recommend that a vehicle containing alcohol be used and that the patient shall make the necessary dilution for each dose.

Their study indicates that deterioration is not so great as is commonly believed. Digitalis leaves of a good quality tend to deteriorate very little, and fluidextracts several years old showed no great amount of deterioration if made with aleohol stronger than required by the U. S. *Pharmacopœia*.

That digitalis, if persisted in for too long a time, will produce untoward symptoms (the so-called cumulative action) has long been the teaching of many pharmacologists, although in recent years this view has been disputed by MacKenzie and his school. Eggleston,<sup>3</sup> in a discussion of the action of digitalis, gives the following explanation of the mechanism of cumulation of digitalis: "Cumulation in the case

<sup>1</sup> Pennsylvania Medical Journal, 1913,

<sup>2</sup> American Journal of Pharmacology, May, 1913.

<sup>3</sup> Journal of the American Medical Association, October, 12, 1912.

of digitalis is the result of a simple summation of amounts absorbed and fixed in the tissues, probably of the heart, and, owing to the firmness of their fixation, the intake is in excess of the elimination. The fixed portion continues to exert its typical action on the heart, and this action is directly dependent on the amount of the drug so fixed. The continued use of the drug, and, within certain limits, the interrupted administration of small doses, raises, by the process of summation, the total amount fixed and acting on the heart to such a point that toxic symptoms develop."

Hatcher<sup>1</sup> contributes an experimental study on the persistence of the action of *digitalins*. Cumulation, in his opinion, depends on the relationship existing among a number of factors, including absorption, elimination, and persistence of action. He found that the action of the digitalins lasted for periods of time which varied widely with the different members of the group, and with the species of animal employed. The action of digitoxin and digitalis persist longer than do those of the other digitalins in common use.

In a study of the emetic action of digitalis bodies, Eggleston and Hatcher<sup>2</sup> investigated the more commonly used digitalis bodies. They had previously shown that the usually accepted idea that vomiting or nausea, following the use of digitalis preparations, was not due to irritation of the gastric mucous membrane, but was due almost entirely to a direct action on the vomiting centre of the medulla. Their present study showed that at present there is no means of securing the cardiac benefit of digitalis without at the same time subjecting the vomiting centre to the influence of the drug. Experiments which resulted in a different interpretation of the emetic action of digitalis are recorded in an article which appeared in the *Münchener medicinische Wochenschrift* for Oct. 9 and 16, 1912. This article states that, in cats, nausea and vomiting from the ingestion of digitalis may result from one of two causes. If the vomiting occurs within four hours, it is due to the irritant action of the drug and almost the entire dose may be recovered from the stomach (digitoxin was used). If a non-fatal dose is employed, resorptive vomiting occurs in six or seven hours, and is accompanied by salivation and general phenomena. As no digitoxin is found in the stomach at this time, the vomiting is evidently due to resorptive reaction and not to irritation of the stomach.

Eggleston and Hatcher<sup>3</sup> insist that there is no advantage in employing digalen, digipuratum, digitalysatum, or the fat-free tincture of digitalis in place of the better known and less expensive galenical preparations. They could find no evidence whatever that any of the above-mentioned variations were less actively nauseant or emetic than the better known preparations.

<sup>1</sup> Archives of Internal Medicine, September, 1912.

<sup>2</sup> Journal of the American Medical Association, February 15, 1913.

<sup>3</sup> Loc. cit.

Fussell<sup>1</sup> advises the use of the infusion when a diuretic action is wished in addition to the effect on the cardiac muscle. He also insists on the requirement that the patients suffering from *cardiac dilatation* should be put at rest in bed and digitalis administered cautiously.

Taylor<sup>2</sup> emphasizes the importance of not meddling with a heart that is effectually performing its work, even though a valvular defect may be present. Speaking particularly with regard to *mitral stenosis*, he insists that the most important thing to do when the heart begins to flag is to put the patient to bed. A month in bed will often bring about a restoration of the compensation without any special medication. In the majority of cases, however, digitalis is also demanded. Taylor prefers the freshly made infusion given in full doses for three or four days, while the patient is resting in bed. Taylor, in some cases, uses convallaria majalis, minimis 10 of the tincture, and he also refers favorably to strophanthus. For the great majority of cases of mitral obstruction, however, digitalis is by far the most powerful single remedy at our disposal.

In regard to the use of digitalis in cases of *auricular fibrillation*, Talley<sup>3</sup> states that the pulse is the best guide as to its use. If the pulse-rate is about 80, and there is no dyspnea on unusual exertion, digitalis is not indicated. With a pulse-rate of 100 at rest, digitalis should be given in doses of from 10 to 15 minimis, three times daily, until the rate is reduced to 70, or the physiological limit is reached. With a pulse-rate of 150 or higher, Talley states that  $\frac{1}{25}$  of a grain of strophanthin should be given intravenously every two hours, and, at the same time, 20 to 30 minimis of digitalis by mouth, four times daily, until the pulse rate becomes slower.

Lea<sup>4</sup> states that while auricular fibrillation cannot be removed or checked by drug treatment, digitalis does have a most potent effect in lessening the severity of the associated symptoms produced by this condition. In his opinion, digitalis acts best in those cases of auricular fibrillation which are rheumatic in origin. In many cases of fibrillation, especially when associated with arteriosclerosis or chronic renal disease, digitalis often fails. As regards the dosage, MacKenzie advocates large doses of the tincture if smaller doses do not produce the desired effect. According to MacKenzie, one need not be afraid of causing toxic symptoms from large doses, as the nausea and headache thus produced will cause the drug to be stopped. After the heart has come under the influence of the digitalis, smaller doses may be employed.

Prior to the introduction of the sphygmomanometer and of modern studies on blood-pressure, it was almost universally believed that digitalis, if given in adequate doses, raised the *blood-pressure*. It is

<sup>1</sup> Loc. cit.

<sup>2</sup> Practitioner, August, 1912.

<sup>3</sup> Pennsylvania Medical Journal, 1913.

<sup>4</sup> Lancet, November 2, 1912.

now beginning to be appreciated, however, that such is not the case. Price<sup>1</sup> reports observations made on 21 patients suffering from various forms of valvular heart disease, with varying degrees of ruptured compensation. He employed the tincture of digitalis in doses of from 15 to 20 minims three or four times a day, and continued its use until evidences of action were manifest. In no instance was there a rise in the blood pressure and in one there was a fall.

Similar results are recorded by Burnet.<sup>2</sup> He also used the tincture in doses of 15 minims every four hours. In 25 cases, which included a variety of cardiac conditions, both organic and functional, he did not encounter a single instance in which the pressure was raised. Even with a pressure of 160, there was no tendency to its increase. So far, from adversely affecting high pressure cases, he found that 10 minim doses of the tincture of digitalis given three times a day, with occasional intermissions, was distinctly beneficial.

Of 7 cases of valvular disease treated with *tincture of strophanthus*, Burnett noted that in four there was a rise in the pressure. As all of them had marked arteriosclerosis, he was uncertain as to whether the rise could be attributed to the strophanthus or not, inasmuch as the other cases in which there was no rise were of a similar character.

Hare,<sup>3</sup> in an editorial article on the effect of digitalis on the blood-pressure, partially accepts the view that the drug does not raise the pressure. He brings out an important point regarding aneurysm, however. Many observers, believing that digitalis does not raise the pressure, state that the drug can be used safely in patients suffering with *aneurysm*. Hare points out that while the pressure may not be raised by digitalis, its use exposes the patient to another danger. Thus the drug powerfully stimulates the muscle of the left ventricle and causes the heart to send out a larger wave of blood with greater force than before. The increased output expelled with great force inevitably increases the strain within the bloodvessel, and, if the aneurysm is located in the arch of the aorta, the effect of this increased strain will also be exerted on the aneurysmal sac. For this reason, Hare believes one should be very cautious in employing digitalis in patients with aneurysm, even though it is shown beyond a doubt that the pressure is not raised.

At variance with the views expressed above are observations made by Marvin.<sup>4</sup> He found that, in addition to slowing the pulse-rate, digitalis produced a marked increase in the blood-pressure, which reached its maximum in five hours and gradually returned to normal after fifty hours. In one instance, a single dose of 14 minims of the tincture

<sup>1</sup> British Medical Journal, September 21, 1912.

<sup>2</sup> Medical Press and Circular, August 7, 1912.

<sup>3</sup> Therapeutic Gazette, January, 1913.

<sup>4</sup> Archives of Internal Medicine, April, 1913.

caused a persistent elevation of the blood pressure for fifty hours. According to Marvin, digitalis has no influence whatever on the respiratory rate.

**Diuretin (Theobromin Sodium Salicylate).** Christian and O'Hare<sup>1</sup> report some interesting experiments on the use of diuretin in *acute experimental nephritis*. Their conclusion was that diuretin, given to rabbits with severe fatal experimental nephritis, shortened the duration of life in these animals.

While it is realized that deductions made from such results as those obtained in animals may not be applicable directly to conditions of a similar nature in human beings, the experiments certainly support the view that diuretin, as a diuretic, may be harmful in cases of acute nephritis in the human being.

**Emetine.** The use of *ippecacuanha* in the treatment of *amebic dysentery* is a striking example of how an efficient agent in the treatment of disease is lost sight of. As far back as 1858, Surgeon E. S. Docker, then stationed in Mauritius, first advocated large doses of ippecacuanha in the treatment of dysentery, and succeeded in reducing the dysenteric death-rate of the island from 10 to 18 per cent. to 2 per cent. Since that time the drug has several times been lost sight of in the management of dysentery, and as often revived. Its last revival was largely due to Manson. Bender, Manson, Rogers, Woodhull, T. L. Rhoades, Dock, and others have attested to the value of ipecac in the treatment of amebic infections of the intestine and liver, and, by some, ipecac is ranked as a specific in the management of these infections. In 1911, E. B. Vedder<sup>2</sup> published some observations on the amebicidal properties of ipecac, and found that the alkaloid emetine possessed to a very high degree the power of destroying the ameba *in vitro*. In this connection reference should be made to some experimental work of Lyons<sup>3</sup> along the same lines. In testing the amebicidal efficiency of various substances *in vitro*, he concluded that ipecac possessed but slight inhibitive properties. This work was done without knowledge of Vedder's results and, furthermore, Lyons' experiments were carried out with ipecac containing only one-fifth of the total alkaloids required by the U. S. P.

Rogers,<sup>4</sup> who was a strong advocate of the use of ipecac in the treatment of amebic infections, was at once attracted by Vedder's experimental results, because of certain objections to the ipecac, namely, that about one-fourth of his patients left the hospital uncured, declining to continue the treatment, while very severe cases died because it was not possible to administer by mouth sufficiently large doses of the drug.

<sup>1</sup> Archives of Internal Medicine, May, 1913.

<sup>2</sup> Bulletin of the Manila Medical Society, March, 1911.

<sup>3</sup> New Orleans Medical and Surgical Journal, 1912.

<sup>4</sup> Therapeutic Gazette, December, 1912; Indian Medical Gazette, November, 1912; February, 1913; Lancet, October 19, 1912; British Medical Journal, June 22, August 24, 1912.

Appreciating the practical importance of Vedder's work, Rogers tested the effects of solutions of emetine on the ameba found in dysenteric stools. He found that the amebæ in them were killed by a dilution of 1 to 10,000 of emetine hydrochloride, and rendered inactive even by so high a dilution as 1 in 100,000. Microscopic examination of the dysenteric ulcers of an advanced case which ended fatally failed to reveal a single living ameba after a dosage of  $3\frac{1}{2}$  grs. in two and a half days.

Rogers has used the hydrobromide and the hydrochloride of emetine with equal success, but he now prefers the hydrochloride, because of its greater solubility in water. He boils the water or normal salt solution and then adds the emetine which is now prepared by several of the drug houses in the form of hypodermic tabloids. The solution thus prepared is put in sterile glass ampoules. He now gives from  $\frac{1}{2}$  to  $\frac{2}{3}$  of a grain (representing from about 40 to 60 grs. of ipecacuanha) to adults, and  $\frac{1}{3}$  of a grain to children about eight years of age.

On several occasions as much as 1 grain was administered two or three times a day without depression or any other untoward symptoms developing. Very occasionally there is some pain at the site of the injection. Rogers says that the most remarkable thing is that, even after the fullest doses, the drug never produces sickness and rarely even any nausea.

Rogers has also tried the administration of the emetine by mouth in a few mild cases. By mouth, he gives two  $\frac{1}{3}$  of a grain tabloids of the chloride on an empty stomach, allowing no food or water for three hours before and three hours afterward. The drug is usually retained, and, if vomiting does occur, it is delayed so long that all, or, at any rate most, of the emetine has been absorbed.

Rogers' results with the old ipecac method and the recently introduced emetine is shown in the following table:

TABLE V.—Comparison of Ipecacuanha and Emetine Treatments.

	Died.			Discharged.			Total.
	Within 3 days.	After 3 days.	Of other disease.	Very bad.	Not cured.	Cured.	
Ipecacuanha	4	7	..	2	4	13	30
Emetine salts	2	..	2	..	..	21	25

Since emetine has been used, Rogers finds that the stay in the hospital has been reduced from an average of 16.4 days under ipecac to 7.2 days. Furthermore, it took 11.4 days for the stools to be normal under the use of ipecac, and the average amount of the drug used was 406 grs; the emetine treatment required 2.35 days for the stools to become normal and but 2 grs. of the drug, equal to 180 gr. of powdered ipecacuanha.

He states that the most important and remarkable fact with regard to the emetine treatment is that the blood and mucus nearly always

disappear from the stools, in a patient with amebic dysentery, in from two to four days. On the other hand, no such effect is noted in cases of bacillary dysentery; therefore, if a case suspected of being amebic in character fails to improve in this respect after two or three days, the evidence is strongly against its being caused by the entameba histolytica. He has never seen an ill result from the emetine in bacillary cases, so that it can be safely employed for diagnostic purposes.

Rogers has already recorded the fact that the use of ipecac in amebic dysentery is almost as efficient in preventing secondary *liver abscesses* as it is against the original infection. He regards the newer emetine treatment almost as great an advance in the treatment of amebic hepatitis as in the dysentery itself. If the abscess is very large, or secondary infection occurs, incision and drainage is required. Rogers believes, however, that if his present "experience is confirmed by further cases, it appears probable that in a large number of amebic liver abscesses which are free from secondary bacterial infection, which amount to 85 per cent. of the whole in my Calcutta experience, incision and drainage will not in the future be often required, greatly to the comfort of the patient, and also with a marked reduction in the mortality of this very serious disease."

In regard to relapses after the employment of emetine, Rogers cannot yet offer positive evidence. In the few cases he can speak authoritatively about, the ameba seemed to have been completely destroyed. At present he is tracing discharged patients with a view of clearing up this point. In this connection it might be mentioned that Simon<sup>1</sup> has published the after-results of ipecac treatment in fifteen patients discharged for from six months to four years. Each of these patients wrote Simon that they had had no recurrence of their trouble, even of the slightest description. They all reported themselves in splendid physical condition and showed gains of from five to forty pounds.

If the emetine is as efficient as Rogers believes in the removal of the primary condition, it is quite probable that its lasting effects will be equal to, if not superior, to the ipecac.

Rogers states that in very grave cases time may be gained by the intravenous injection of the emetine. This he has found can be done safely.

Chauffard<sup>2</sup> reports 2 sporadic cases which came under his observation, both of which were completely cured as the result of emetine injections.

Baermann,<sup>3</sup> located in Sumatra, also praises the use of emetine in amebic dysentery. He reports on its use in 22 cases. In 6 of these cases the disease had caused such extensive changes in the mucosa

<sup>1</sup> New Orleans Medical and Surgical Journal, November, 1912.

<sup>2</sup> Bulletin de l'Academie de Médecine, February 25, 1913; Presse Médicale, May 10, 1913.

<sup>3</sup> Med. Klin., June 1, 1913.

of the colon and such impairment of the general health that it was impossible to avert a fatal termination. The autopsy revealed, however, that the ulcers must have started to heal at once under the use of emetine, as they were either entirely healed or well on the way toward healing; in 3 cases, no amebæ could be discovered.

Baermann found the drug most efficacious if the first one or two injections were given intravenously in doses of from 150 to 200 mg. (the maximal dose being 250 mg. per 135 pounds body weight). The intravenous injections are followed by four or five subcutaneous injections of 100 to 120 mg. at two- or three-day intervals. The subcutaneous injections should be repeated at intervals of three or four weeks.

H. G. Beck<sup>1</sup> reports 7 severe cases of amebic dysentery, 3 being complicated with liver abscess, in which recovery or marked improvement was obtained by the use of *ippecacuanha*. In order to avoid the objectionable features of the ipecac treatment, Beck advises the use of the Einhorn duodenal tube whereby the ipecac is introduced directly into the intestinal canal, thus avoiding the nausea and vomiting which frequently arises when the ipecac is taken by mouth. Simon<sup>2</sup> overcomes the objectionable features of the ipecac treatment by employing 5-grain salol-coated pills freshly made. The depth of the salol coating should not exceed  $\frac{1}{8}$  of an inch, and preferably should be nearer  $\frac{1}{16}$  of an inch. The quantity of salol in each pill varies between  $1\frac{1}{2}$  and 2 grains. While as much as 30 grains of salol may be taken in this way in twenty-four hours, Simon has never noted any ill effects from it.

**Eucalyptus.** Pedigo<sup>3</sup> reports excellent results in the treatment of *pulmonary tuberculosis* by means of eucalyptus oil used in the form of an inunction. The ointment is 25 per cent. strength, the eucalyptus being incorporated with the following base:

Olive oil	5ij
Benzoated lard	5vj
Cocoa-butter	3iv

The above is used during the cool months of the year, while in summer cocoanut oil is used as the base. Pedigo directs that one teaspoonful of either of the above preparations be thoroughly rubbed into the skin until it disappears. This amount contains fifteen minims of eucalyptus oil. The most striking early effect has been a change in the character and quality of the sputum which for a time becomes more profuse but gradually diminishes, and, in addition, changes from a yellow, viscid character to a frothy, white appearance. In addition, the cough also diminishes. Coincidently with these changes the temperature falls, and the patient generally reports a feeling of well-being.

<sup>1</sup> Journal of the American Medical Association, December 14, 1912.

<sup>2</sup> Loc. cit.

<sup>3</sup> Therapeutic Gazette, March, 1913.

Pedigo also has had excellent results with the eucalyptus oil in the treatment of acute "colds," some of which have been aborted by its use.

Without questioning the observations of Pedigo, I am somewhat skeptical as to the value of any drug in influencing the cough and expectoration encountered in pulmonary tuberculosis. An amelioration of these symptoms occurs, as a rule, with the general improvement of the patient, as the result of the hygienic and dietetic method of treatment. I can conceive that occasionally this method might be efficacious as a temporary relief measure, but not otherwise.

**Fresh Air.** Hill,<sup>1</sup> in an article on the physiology of the open-air treatment, states that, in his opinion, the effect of the treatment is due to the temperature, movement, and moisture of the air, and has nothing to do with its chemical properties. Modern life is tending more and more to house people in confined places, heated by furnaces and with perfectly made windows allowing very little circulation of fresh air. As a result, health and vigor are diminished and all sorts of illnesses, besides consumption, develop. In order to counteract the deteriorating effects of artificial living, Hill recommends plenty of open-air exercise and a life in the open.

One of the most beneficial innovations of the modern crusade against tuberculosis is the open-air school, the first being opened in 1908; at present there are about 177. For several years past it has been well recognized that many other diseases besides tuberculosis do better under the open-air treatment than under the conditions which formerly obtained in our hospitals.

Brannan,<sup>2</sup> who has done so much for the *open-air school* in New York City, has recently published an article urging the extension of this idea. He believes that all patients, whatever their disease may be, and all school children, whether predisposed to tuberculosis or not, shall be placed in an atmosphere approximately the same as that out of doors.

Conditions especially benefited by the open-air treatment are those in which there is nervousness and restlessness. The quieting influence of this method is especially beneficial in *acute insanity*, as it not only aids in reducing the restlessness, but induces sleep. The same is true in *alcoholic patients*, the fresh air and oxygen furnishing the stimulation which they greatly need, so that they eat and sleep well. The tremulousness and mental depression so commonly present in these patients disappear very quickly.

The advantages of the open-air treatment are now well recognized in the *functional nervous diseases*, as patients so treated, besides sleeping and eating better, are generally stimulated. Surgeons have also begun to appreciate the fact that patients, after severe operations, gain rapidly

<sup>1</sup> Lancet, May 10, 1913.

<sup>2</sup> Medical Record, June 7, 1913.

if placed out of doors, and in critical cases, the stimulus of the fresh air seems to turn the tide toward recovery.

Improvement in modern hospital construction is well illustrated in the new Bellevue Hospital of New York City. Every ward has at least one balcony attached to it, so that every patient, whatever his disease, may have the benefit of the out-door air. In addition to the balconies, there are wide loggias, and extensive lawns and roof gardens. Recently the hospital authorities have added storm sashes and louvre windows to the balconies, so that even in winter the patients can be moved out of doors. One or more sides of the balconies are always left open for the free entrance of the outer air.

Hoobler<sup>1</sup> has made a study of the effects of cold air on the *blood-pressure of children and young adults* in various stages of tuberculosis.

He summarizes his results as follows:

"1. Blood-pressure in children having tuberculosis is persistently low, as has been found to be the case in adults.

"2. When a patient is transferred to the open air, there is a gradual increase of blood-pressure within one or two hours.

"3. If the patient is kept constantly in the open air, the pressure is raised to well within the normal limits and sustained at that point as long as the patient remains in the open air.

"4. The more advanced the case the lower the pressure indoors, and the higher the rise when put in the open air.

"5. After several days in the open air, the blood-pressure does not fall as much when placed in the ward as it did previous to outdoor treatment."

These observations are interesting, and throw some light on the good effects obtained in *pneumonia* patients subjected to the same treatment. It is pretty well recognized now that if the blood-pressure can be maintained in *pneumonia*, the outlook is favorable. A fall in the blood-pressure is ominous, and, if it cannot be restored to its normal level, death will probably ensue. It is obvious, therefore, that anything which will aid in keeping up the pressure in *pneumonia* patients is a distinct advantage. Exposure to the cold, open air in all probability aids in accomplishing this.

Exposure to direct sunlight (*heliotherapy*) has been advocated frequently in the treatment of *surgical tuberculosis*. Aimes<sup>2</sup> has found this method valuable in a variety of non-tuberculous affections—such as varicose ulcers, burns, sprains, contusions, certain gynecological affections, atrophied muscles, resolution of inflammatory exudates, and the sequels of phlebitis and conjunctivitis. Aimes states that of 48 eyes affected with trachoma, 35 were cured by exposure to the direct sunlight at two sittings. The conjunctiva of the lids bears prolonged exposure

<sup>1</sup> American Journal of Diseases of Children, November, 1912

<sup>2</sup> Presse Medicale, March 19, 1913.

to the direct sunlight without harm. Heliotherapy did not cause any improvement, however, in rheumatic iritis, in mycosis, or in syphilitic affections.

Poncet<sup>1</sup> has contributed a number of articles on so-called *tuberculous rheumatism*. He now asserts that chronic arthritis is, in a large proportion of cases, tuberculous in nature. In many instances he cites, the true nature of the trouble has been obscure until the tuberculosis unmasked itself by manifestations elsewhere in the body. The practical point of his observations is that it is safer to treat a chronic joint affection as if it were known positively to be of a tuberculous nature; patients of this class should, in his opinion, be treated for tuberculosis rather than for a gouty tendency or an arthritic diathesis.

The general treatment outlined by Poncet is essentially that of tuberculosis—forced feeding, rest, and fresh air. He lays the most emphasis, however, on the exposure of the joint to the direct rays of the sun. In his twenty years' experience, very few patients have failed to benefit by the heliotherapy. Although the trouble may heal as the result of heliotherapy alone, operative interference may be necessary in case of ankylosis. In these cases, resection and early mobilization give brilliant results.

In the treatment of *osteomyelitis*, Hammond<sup>2</sup> states that after the operation has been performed there is nothing which will contribute so much to the upbuilding of the patient's general health, and the firm closure of the sinuses, as a prolonged residence at the seashore, with sea bathing and exposure of the body to the sunlight.

The effect of a high altitude on the blood has been studied by Laquer.<sup>3</sup> From observations made on his own blood while living at a low altitude and these during a stay of four weeks at an altitude of 9000 feet, he found that the red count and the hemoglobin both increased at the high altitude. The rise began slowly during the second week, and on the fifteenth day reached the maximum, the red cells having increased 15 per cent. and the hemoglobin 16 per cent. After his return to the lowlands, the red count and hemoglobin quickly fell to their original level. Experimental observations on dogs seemed to confirm these observations. Thus dogs bled until about half the blood volume was removed, were divided into two groups, one being taken to an altitude of 9000 feet and the other remaining in the lowlands. In the former group it took sixteen days to restore the blood volume to normal, while in the latter it required twenty-seven days.

Cohnheim and Weber are quoted as showing that the blood of men who had worked for years at an altitude of from 9000 to 11,000 feet, had a higher red count and hemoglobin percentage than normal men living at lower levels.

<sup>1</sup> Presse Médicale, March 26, 1913.

<sup>2</sup> American Journal of Orthopedic Surgery, May, 1913.

<sup>3</sup> Deutsch. Arch. f. klin. Med., 1913, Band cx, No. 3.

**Friedmann's Cure.** Without doubt the most notable, or, perhaps, notorious would be the better term, therapeutic announcement of the past year was the so-called Friedmann cure for *tuberculosis*. And while those who were entrusted with the task of demonstrating the validity of Friedmann's announcement have practically repudiated his claims, there still remain a large number, the laity particularly, who are unfamiliar with the facts, and who still nourish the hope that some benefit may be expected from the treatment.

The history of the Friedmann episode is briefly as follows: Some six or seven years ago, Dr. F. F. Friedmann, a Berlin physician, published a paper in which he reported some observations made on a case of tuberculosis noted in a turtle. The tubercle bacilli isolated from this turtle were of an avirulent type and the suggestion made at this time was that these avirulent organisms might be utilized in the production of an immunity against tuberculosis in human beings. No serious consideration was given to this paper. From this time until the paper read before the Berlin Medical Society, November 12, 1912, the literature fails to record any other papers contributed by Friedmann.

On the date above mentioned, he read a report of a new method of treating tuberculosis by means of living, avirulent tubercle bacilli, presumably from the same source as those previously reported on. The originality of the method will be referred to later.

Within a few days of the reading of the paper in Berlin, many American newspapers published a syndicate letter written by a Berlin correspondent, which stated without equivocation the discovery by Friedmann of a positive cure for tuberculosis. For several months the original newspaper announcement was followed up, almost daily, by equally positive assertions as to the certainty of the discovery. This newspaper campaign was particularly active in the middle west. I also saw several featured articles in the newspapers of the smaller cities of Pennsylvania. One can hardly find a term suitable to express one's condemnation of the character of some of these newspaper articles. It is now common knowledge that these articles deluded thousands of sufferers from tuberculosis with the hope that they could be cured. After several false reports as to his leaving for America, he finally arrived early in the spring of this year. It was inevitable that some official action would be necessary because of the widespread interest in the subject. Even before it was known that Friedmann intended visiting this country, the Public Health Service, one of whose duties it is to investigate the diseases of man and their method of control, wrote to Dr. Friedmann as to whether he would submit the details of preparation and administration of his remedy; and, if so, under what conditions.

The following facts are taken from the report presented at the Annual Meeting of the National Association for the Study and Prevention of

Tuberculosis by Anderson and Stimpson<sup>1</sup> chairman and recorder respectively of the Board appointed by the Public Health Service.

In the correspondence that ensued, Friedmann expressed a willingness to place at the disposal of the Public Health Service all the facts at his command, and to aid them in every way toward bringing out a "comprehensive and impartial report." In the meantime, Friedmann arrived in America, and the Board appointed by the Public Health Service ascertained that he was not willing, as he had previously stated, to reveal the details of his methods. He did, however, furnish a culture of the organism he used, but declined to give any information regarding the preparation. He then imposed, as a condition to finally furnishing detailed information regarding the methods of preparation of his remedy, a recognition by the Board of favorable results from the use of the remedy on patients. The Board, in effect, found that, under the conditions mentioned, it would have opportunity only to study a culture of the bacteria said to be used in some way by Dr. Friedmann in the preparation of his treatment, to test its pathogenicity on the lower animals, and to observe the effect of treatment by him of tuberculous patients with his finished remedy. Although this arrangement was far from satisfactory, the Board resolved to accept the conditions. Arrangements were accordingly made with the staffs of several of the New York City Hospitals to supervise the treatment in a number of patients. At the time the Board made its report before the National Association, detailed information as to results could not be given, owing to delays caused by Friedmann's repeated absences from New York. Suffice it to say that, after two months observation, nothing had developed in the treatment of the cases under observation to warrant Friedmann's original claims.

Regarding the culture which Friedmann furnished the Board, Anderson and Stimpson report that "we may state that a series of experiments is under way. The bacillus has been found to be an acid-fast organism having properties quite different from those of any tubercle bacillus with which we are acquainted. It appears to be identical with an organism cultivated from a few loopfuls of the material used for injection, which Dr. Friedmann permitted us to place on culture media in his presence. We requested Dr. Friedmann to furnish us with a larger amount of this material for examination, but this he has declined to do. We can state, however, that living, acid-fast bacteria are being injected by the intramuscular and intravenous method, although we are ignorant of what medium they are suspended in or what additional substance or substances may be contained in the final mixture."

A word as to the newness of Friedmann's method, granting that the organisms he uses are true tubercle bacilli. The following brief account of previous efforts toward obtaining immunity by means of living organ-

<sup>1</sup> Journal of Outdoor Life, June, 1913.

isms is taken from an editorial article.<sup>1</sup> In 1892 and 1893, Trudeau demonstrated that subcutaneous inoculation of living cultures of the avian tubercle bacillus greatly increased the resistance of rabbits against infection by virulent mammalian cultures.

In 1894, de Schweinitz reported on the immunization of animals with human tubercle bacilli which had been cultivated for twenty generations on slightly acid broth, thus rendering them avirulent.

In 1902, and again in 1905, Pearson and Gilliland reported that they had succeeded in rendering cattle immune by means of human tubercle bacilli. Still more recently, Webb and Williams reported on the production of immunity by means of living organisms. Their methods differed from the others in that they began with a single bacillus and gradually increased the number. All of this work, it is to be noted, was done by Americans. Similar observations have been made also by McFadyean, von Behring, and Thomasson. It is thus seen that there is nothing new in the method, and that it is only slight variation of a method frequently employed before.

In regard to the production of immunity by means of living organisms, it is not generally known that the method has been abandoned by veterinarians because of its danger. Furthermore, it is the opinion of veterinarians that the method should be prohibited by law, as it is now known that cattle so immunized will harbor living tubercle bacilli, virulent for human beings, for months and even years. In other words, while one may succeed in producing an immunity in cattle against bovine organisms, the human organisms employed for the purpose lie dormant in the animal and may become a source of danger to human beings at any time.

This fact brings up a possible danger in the Friedmann treatment. If the turtle bacilli he employs should be in reality human tubercle bacilli which have become avirulent because of their changed habitat, it is not unreasonable to believe that they might revert to their former virulent state when replaced in their normal host.

I have considered the Friedmann episode somewhat fully because the question is of the utmost importance. Even now that the preliminary excitement has subsided, the danger of people being deceived is still present. Although the New York City Health Officials took the commendable stand that they would not permit the opening of a Friedmann Institute, other communities have not taken the same view. At present there is one such place in operation, and doubtless others will follow. The following resolution adopted by the National Association expresses the attitude of those in a position to best judge of the merits of the question: "Whereas, widespread publicity has been given to the claims of an alleged cure for tuberculosis;

"Resolved, That there is no information before the National Associa-

<sup>1</sup> Journal of the American Medical Association, March 8, 1913.

tion for the Study and Prevention of Tuberculosis to justify the belief that any specific cure for tuberculosis has been discovered which deserves the confidence of the medical profession or of the people; and

"Resolved, That it is the duty of the public to continue unabated all the present well-tried agencies for the treatment and prevention of tuberculosis."

Finally, in closing, it is interesting to note the attitude assumed by Friedmann's confrères in Germany. The Berlin letter of the *Journal of the American Medical Association* for August 2, 1913, contains the following information: At a meeting of the Berlin Medical Society, Prof. Schleich, who seems to have been Friedmann's only supporter, offered a resolution to the effect that the Society appoint a committee to undertake a scientific test of the remedy. The Executive Committee and the President unanimously declined the proposal, and stated that the test could easily be made by Friedmann furnishing the remedy to clinicians. This was concurred in by the Society as a whole.

**Heroin.** Heroin was for some years supposed to be free from danger of producing the drug habit. Within the past few years, however, not a few cases have been reported in which individuals have become addicted to the drug.

Symes<sup>1</sup> records an instance in which a young woman was given some heroin tablets and a hypodermic syringe by a physician, who assured her there was no danger of contracting the habit. The heroin was prescribed for a neuritis affecting the right arm. This was in 1906; by 1911 she was taking four to five grains of the drug daily, and had become firmly addicted to its use, although the trouble for which it had been recommended had long since ceased.

This patient became extremely nervous and fidgety as the effects of a dose wore off, and was, in addition, very emotional. She finally suffered a gradual failure of health, lost weight, became averse to physical exertion, and much depressed. Symes treated her by gradual reduction and the substitution of small doses of morphine which were also gradually reduced. Six months after discharge, she was in splendid health and claimed to have no craving for the drug.

Phillips<sup>2</sup> reports three cases which came under his observation. He emphasizes the fact that too many physicians fail to appreciate that heroin is far from the harmless drug they apparently think it is. In his opinion, heroin should be prescribed with the same care as morphine.

Heroin is undoubtedly given too freely, and without due regard to the danger of inducing the drug habit.

I have had 2 such cases under my observation. Both were very irritable, and both suffered a severe breakdown in health. Both were treated by complete withdrawal. Both these patients are in splendid

<sup>1</sup> Bristol Medico-Chirurgical Journal, June, 1912.

<sup>2</sup> Journal of the American Medical Association, December 14, 1912.

health today, seven and three years, respectively, since they ceased using the drug. While it is now clearly established that heroin is capable of producing drug addiction, it appears to be relatively easy to break the habit, even after it has been established for years. Furthermore, once the patient is freed from the use of the drug, there does not seem to be any craving to resume its use.

**Hexamethylenamin (Urotropin).** The value of formaldehyde-containing drugs has become so firmly established in infections of the urinary tract that they are now employed routinely. L'Esperance<sup>1</sup> contributes an interesting article on the use of *urotropin as a urinary antiseptic*.

Burnam's<sup>2</sup> experiences show that the use of hexamethylenamin in cases of urinary infections gives results superior to any other drug in common use, but points out that those cases in which no free formaldehyde formed failed to benefit by the administration of the drug, although hexamethylenamin could be recovered from the urine. Burnam believes that, when the drug is given, the urine should be tested for formaldehyde, and ascending doses given until this substance appears or until evidences of vesical irritation develop, the object being to give the largest dose possible without producing bladder irritation. In order to detect the formaldehyde, the phenylhydrazin-nitroprussid, or Burnam test, should be used. The test is simple, quickly performed, and can be done by anyone. The steps are as follows:

To about 10 c.c. of suspected urine in a test-tube at body temperature there is added: (1) Of solution phenylhydrazine HCl 0.5 per cent. gtt. iij; (2) solution sodium nitroprussid 5 per cent. gtt. iij; (3) of saturated solution sodium hydrate, a few drops poured along the side of the test tube. If formaldehyde is present, as this latter solution diffuses throughout the urine in the tube, a deep, purplish-black color is seen, quickly changing to a dark green, which gradually assumes a lighter shade of the same color and finally changes to a pale yellow.

If the urine does not contain formaldehyde, the following color reaction occurs: As the saturated solution of sodium hydrate diffuses through the urine in the tube, a reddish color is seen, which gradually turns to a light yellow. Burnam applied this test to the urine of 250 patients. He found that 133, or 52 per cent., showed the presence of formaldehyde, while 120 or 48 per cent. did not. As a result of his investigations, he draws the following deductions:

Formaldehyde appears in the urine of a little over half the patients with urinary infection.

Reaction of the urine is of no importance.

Alkalies taken with, or in combination with, urotropin have no effect on excretion. Duration of the excretion of formaldehyde is about four to six hours.

<sup>1</sup> Boston Medical and Surgical Journal, October, 24, 1912.

<sup>2</sup> Archives of Internal Medicine, October, 1912.

Increase of dosage does not affect excretion in negative urines.

Urotropin is practically symptomless in the average dose.

The urine of all patients taking hexamethylenamin should be tested for formaldehyde.

Burnam is skeptical as to the value of hexamethylenamin either as a curative or prophylactic agent in the treatment of infections of the biliary passages, respiratory passages, or cerebrospinal system. On the other hand, Crowe,<sup>1</sup> who has done much to introduce the use of the drug in these conditions, furnishes clinical evidence showing that urotropin is extremely valuable.

Crowe states that it has been a routine measure at the Johns Hopkins Hospital since 1908 to administer hexamethylenamin in all cases in which a meningeal infection is a possible, or a threatened, complication.

Of 20 cases of *compound fracture of the vault*, all of a similar nature, 4 of the 8 earlier cases in which hexamethylenamin was not given, died. The remaining 12 cases received hexamethylenamin, and, in this group, but 2 died, both from a *pneumococcal meningitis*.

Of 40 cases of *hypophysis tumor* operated on, hexamethylenamin, in doses of from 40 to 60 grains, was given for twenty-four hours preceding the operation, and in even larger amounts for several days following the operation. In 31 of these cases, there were no post-operative complications whatever. In the remaining nine, there were symptoms suggestive of a meningeal infection. Three of this group finally succumbed with meningitis, while the remaining 6 recovered.

Crowe states that urotropin, given either by mouth or rectum, makes its appearance in the bile and in the urine almost simultaneously. If the drug is given in sufficiently large dosage, at least 75 grains a day, it appears in the gall-bladder in a concentration which is effectual in inhibiting the growth of bacteria.

Crowe believes that urotropin is frequently of the greatest value in aborting an *acute coryza*. In this condition, the drug must be administered at the very first evidence of the infection, and given in sufficiently large doses, 100 to 120 grains, well diluted in water.

Eisenberg<sup>2</sup> draws the following conclusions regarding the use of hexamethylenamin in infections of the upper air passages: (1) Hexamethylenamin is a valuable remedy in the treatment of the inflammatory conditions of the upper air passages; (2) it must be given in doses large enough to secure its full physiological effects; (3) no untoward symptoms were observed while given in fairly large doses (up to 30 grains daily); (4) it seems to prevent possible complications of *acute rhinitis, bronchitis, and sinusitis*.

La Roque<sup>3</sup> has found hexamethylenamin efficient in preventing *post-*

<sup>1</sup> Bulletin of the Johns Hopkins Hospital, September, 1912.

<sup>2</sup> Journal of the American Medical Association, June 29, 1912.

<sup>3</sup> Therapeutic Gazette, July, 1913.

*operative tympany.* His observations are based on its use in about 300 cases. He recommends the following procedure: "When practicable, 10 grains of hexamethylenamin, dissolved in a glassful of water, are administered every two hours between meals while the patient is awake, for two days previous to operation. The evening before, or the morning of the operation, the usual bowel cleansing with castor oil and an enema is done. Immediately after the operation, the nurse dissolves 120 grains of hexamethylenamin in a quart of ordinary drinking water, usually without ice, and as soon as the patient complains of thirst, small quantities of this are given at a time, the quantity being cautiously increased as the stomach becomes retentive. In this way the patient usually takes and retains at least a quart of water containing 120 grains of the tasteless drug during the first twelve or twenty-four hours. By this time they can commonly retain a glassful of water at a time, and 10 grains of hexamethylenamin dissolved in a tumblerful of water are administered every two hours until between 60 and 120 grains are given each twenty-four hours, for seventy-two hours after operation."

If excessive vomiting is present, or if, for any purpose, water is being given by rectum instead of the mouth, the hexamethylenamin is added to the water or saline thus given.

La Roque has also obtained good results with urotropin in the treatment of *catarrhal jaundice*.

Johnson and Watt<sup>1</sup> employ hexamethylenamin in the treatment of *typhoid fever*, giving 5 grains four times daily to adults, and 2 to 3 grains to children.

Crowe<sup>2</sup> states that he has abandoned the practice of giving 10 to 15 grains of the drug at stated intervals because of the large quantity of water necessary to dissolve it. If the patient is very ill, the drug is best given by rectum. From 50 to 100 grains are dissolved in 1 liter of salt solution and allowed to flow slowly into the bowel a drop at a time. He has never noticed any irritation of the intestinal mucosa, even after one to two weeks of almost constant administration by this method. Given by mouth, Crowe adds from 2 to 3 grains of the drug to each ounce of water, and, inasmuch as it is tasteless, it is possible to give from 60 to 100 grains daily without the patient's knowledge and without producing either gastric or renal irritation. While some individuals are undoubtedly sensitive to hexamethylenamin, which, even in small doses, may produce a skin rash, catarrh of the mucous membranes and gastric or renal irritation, Crowe does not believe that this should invalidate against the use of the drug. Of 95 cases in which the average dose was 75 grains a day for ten days, painful micturition and hematuria occurred in seven instances. Four of these rapidly cleared up on the withdrawal of the drug.

<sup>1</sup> New York Medical Journal, February 1, 1913.

<sup>2</sup> Loc. cit.

Burnam<sup>1</sup> observed untoward symptoms in 5 patients out of 130 showing formaldehyde in the urine. The symptoms varied from a slight hematuria and burning along the urinary tract to a vague malaise. Withdrawal of the drug caused a prompt subsidence of the untoward symptoms.

**Hydrotherapy.** Swan concludes that carbonated brine (Nauheim)<sup>2</sup> baths act very inconstantly on the blood pressure, although their tendency is to raise the systolic pressure. He states that there is no method of determining beforehand whether the effect of the bath will be to raise or lower the pressure. In 81 cases, the pressure was higher at the end of the course of treatment than at the beginning in 39, lower in 34, and unchanged in 8. His studies have led him to the belief that the benefit in the subjective symptoms in cases of heart disease which follows a course of carbonated baths is not dependent on the influence of the treatment on the *blood-pressure*.

Hickling<sup>3</sup> makes the following statements regarding the effect of baths in cases of *rheumatoid arthritis*. The immediate effect of the bath varies in different individuals, and even in the same person at different times. A fall in the systolic pressure is more frequent than a rise, but an increase in blood-pressure is noted more often when the douche is used than when it is not; the douche does not always produce a rise however. A short course of baths shows very little alteration in the blood-pressure, while a prolonged course has no appreciable effect one way or another in cases of rheumatoid arthritis. Sea bathing is one of the commonest forms of recreation during the summer months, and yet it is an open question as to whether more people are not injured than benefited. Hare<sup>4</sup> cautions against individuals of over fifty years indulging in sea bathing except in the most cautious manner. For people past middle life, surf bathing is harmful in direct proportion to the degree of disease in the heart and bloodvessels. This is especially true if the water is cold and there is much surf, the latter not infrequently causing the individual to resort to active exercise in order to keep on his feet. Hare states that he has knowledge of several instances in which sudden death occurred in persons who had tired hearts induced by high blood-pressure while surf bathing. He believes that possibly some of the cases in which death has been ascribed primarily to drowning are instances of cardiac failure due to overburdening of the heart by contraction of the peripheral capillaries on the one hand, and by the arm and chest movements resorted to in swimming, the primary cause of death being circulatory, although the final cause may be drowning when the individual is in a state of syncope.

<sup>1</sup> Loc. cit.

<sup>2</sup> Archives of Internal Medicine, August 15, 1912.

<sup>3</sup> Medical Chronicle, October, 1912.

<sup>4</sup> Therapeutic Gazette, June, 1913.

Riesman<sup>1</sup> in referring to the popularity of certain of the European health resorts for the treatment of *hypertension* and *cardiovascular conditions*, doubts whether there is anything specific either in their waters or their baths. He points out, what is coming to be recognized more and more, that the favorable results obtained in many of these cases is in all probability due to the freedom from care, the regular hours, and greater frugality of living—a mode of life which is apparently endurable to many, only when obtained at a high cost.

**Iodine.** In a study of the pharmacology and therapeutic value of organic iodine preparations, McLean<sup>2</sup> derives the following conclusions:

“1. Up to the present it has not been shown that the organic iodine preparations, with the exception of preparations of thyroid, have any specific action in pathological conditions, except of the action of iodine after separation from the molecule.

“2. The iodized proteins seem to be of advantage for therapeutic use only insofar as they avoid gastric irritation. The more stable compounds are apparently not entirely split in the body and are therefore not well utilized, while the less stable compounds have no advantages over the alkaline iodides, either as to local effects or as to rapidity of absorption and excretion.

“3. The iodized fats and fatty acids appear to have some advantage when the continuous action of small amounts of iodine is desired. They are more slowly and evenly split, and the amount of available iodine in the blood does not vary from time to time to the extent that it does when the alkaline iodides are administered. The use of the iodized fats in such conditions as arteriosclerosis, bronchial asthma, lead poisoning, etc., probably has some rational basis, therefore, on physiological grounds. These substances are also as a rule non-irritant to the stomach.

“4. The difference in frequency of iodism is probably due to the difference in the amount of available iodine present in the body at any one time. When large amounts of iodine are desired, as in cerebrospinal syphilis, avoiding the danger of iodism would be at the sacrifice of therapeutic efficiency.

“5. The use of organic iodide preparations with toxic side actions, due to the molecule or its splitting products, should of course be discouraged. The products of iodine with the higher fats and fatty acids are generally free from toxic actions.”

Iodine, in some form, has long been a favorite method of treating *tuberculosis*. Hotz<sup>3</sup> states that the use of iodine results in a marked increase in the number of lymphocytes, which is especially desirable in tuberculous conditions. The use of iodoform or tincture of iodine

<sup>1</sup> American Journal of the Medical Sciences, April, 1913.

<sup>2</sup> Archives of Internal Medicine, November, 1912.

<sup>3</sup> Mitt. a. d. Grenzgeb. d. Med. u. Chir., Band xxv, No. 1.

intravenously, subcutaneously, by inhalation or by inunction will produce a lymphocytosis by the third day. Hotz believes that iodine brings about a reaction, the principal nature of which is the lymphocytosis and the ferment of the lymphocytes acts on fat, including the fat of bacteria. He has employed this treatment in 49 cases with tuberculous joints; 31 healed without impairment of function; 13 healed with ankylosis; and there were but 5 failures.

Richardson<sup>1</sup> has used tincture of iodine in the treatment of *sore or abraded feet*, caused by long marches, with excellent results. At first he washed the abraded surfaces with soap and warm water, but later, in order to meet conditions as they would arise in actual service, he simply painted the abraded area with the official 7 per cent. tincture of iodine and allowed it to dry. If a blister had formed, it was first painted with the tincture of iodine and then incised with a bistoury, care being taken to enter the blister under and beyond its raised surface. After expelling the serum, a second coating of the iodine was given. In case of simple abrasions of the superficial layers of the skin, no dressings, ointments, or powders were applied. On reporting the following morning, the men were invariably well and needed no further treatment.

Madden<sup>2</sup> highly praises the use of *iodine as a surgical dressing*. He employed it in a variety of operations, with a poor result in but one instance, which he attributed to carelessness.

The use of iodine as a *skin disinfectant* before operative procedures is now the almost universal custom. Monod<sup>3</sup> reports 140 cases of children in which the operation field was sterilized by the use of iodine. 19 of his patients were under two years of age. He has never noticed any ill effects, such as irritation of the skin. He refers to two instances reported by Boisse, in which an eruption and fever, resembling scarlet fever, developed after operations in which iodine has been used as a skin disinfectant. Monod, however, is skeptical as to whether the iodine had anything to do with it. In this connection, an article in the *Wisconsin Medical Journal* for April, 1912, states that unpleasant results sometimes occur from the use of iodine as a skin disinfectant. This is especially true if a hot, wet dressing is used after the operation. Under these circumstances, a severe dermatitis may develop even when the iodine has apparently been removed with alcohol before the dressings are applied.

The use of a wet dressing over the site of the operation, or even the use of a small amount of water in the form of lather for shaving the part, may lead to the development of an iodine dermatitis, unless the skin is very thoroughly dehydrated with alcohol, followed by ether and completely dried before the tincture of iodine is applied.

<sup>1</sup> Military Surgeon, November, 1912.

<sup>2</sup> British Medical Journal, September 28, 1912.

<sup>3</sup> Archives de Medicine des Enfants, May, 1913.

According to a note in the *New Orleans Medical Journal* for October, 1912, the danger of producing irritation of the skin may be removed by the following procedure:

After the application of the iodine, the surface is covered with a layer of absorbent cotton, and about five minutes later the cotton is soaked with a 5 per cent. solution of hyposulphite of sodium, warmed to about 104° F. The iodine is changed to iodide of sodium by the solution, which removes the irritation, and being practically a physiological solution, it is painless even to wounds or to tissues other than the skin. This method originated with Prof. Sabbatini, of Padua.

Garton<sup>1</sup> recommends iodine as a *wound disinfectant* in wounds of the extremities, where it is often impossible to remove the dirt and grease. In these cases he advises: (1) Stop all hemorrhage; (2) mop off with dry gauze; (3) immerse in 7 per cent. (the official) tincture of iodine; (4) sew up if necessary; (5) bandage in dry gauze; (6) avoid water in any form.

Garton states that some surgeons are opposed to the use of iodine as a skin disinfectant, because of the blistering or dermatitis that sometimes follows. This, he states, can be avoided by washing off the excess with pure alcohol after the wound is closed.

The method used at the Norfolk Naval Hospital is as follows: A bath may be given a full thirty-six hours before the operation. Shaving the part may be done twelve hours before the operation, using alcohol instead of water. Nothing more is done until the patient is on the operating table and the skin bared. The operation field and surrounding area is then painted with the official tincture of iodine by means of a sterile cotton swab. Five minutes is then allowed to elapse before the operation is begun.

After the wound is closed, another light application is made to the incision, the excess of iodine is removed with gauze saturated with pure alcohol and a dry dressing then applied.

Garton states that the two essential features of iodine sterilization are: (1) Not to allow water to touch the skin for thirty-six hours before the operation, and (2) to wait fully five minutes after the application has been made. If water should by any chance touch the operative field, or if the patient sweats, pure alcohol should be applied.

Arnozan and Carles<sup>2</sup> report favorably on the internal administration of tincture of iodine in the treatment of *typhoid fever*. They recommend 15 to 18 drops of the tincture a day, in wine or milk. Raynaud had previously reported favorable results from the use of the tincture of iodine in typhoid fever. He combined potassium iodide with the iodine.

Iodine has been added to the already long list of drugs employed in

<sup>1</sup> United States Naval Medical Bulletin, April, 1913.

<sup>2</sup> Jour. de Médecine de Bordeaux, November 17, 1912.

the treatment of *whooping cough*. Cavazzani<sup>1</sup> claims to have had excellent results with iodine during the past ten years. His method is as follows: Metallic iodine is dissolved in a solution of potassium iodide in the proportion of one part of iodine to fifteen parts each of potassium iodide and water. Of this mixture, he gives 4 to 6 drops a day in sweetened milk to a child of one year, increasing up to 10 to 15 drops for children over five years. He has never noted any intolerance, and believes that it diminishes the attacks of whooping, shortens the disease, and makes it generally milder. In some instances, he adds quinine or camphor monobromide to the iodine.

In the treatment of *smallpox*, Pedley<sup>2</sup> advises the local use of tincture of iodine. On the first appearance of the eruption the papules are painted with the tincture of iodine, using it twice a day. Although the patient, on whom Pedley tried this treatment, had a profuse eruption on the face, chest, arms, and hands, the patient stated that the iodine was cooling and grateful, and asked to have it repeated. There was no itching, no discomfort, and no secondary fever whatever, the vesicles collapsed and shriveled, and the cuticle shed, leaving a clean, white surface, free from scars. The iodine was applied for six days.

**Lactic Acid Bacilli.** Peiser<sup>3</sup> reports some observations on the use of alkalinized kefir in the treatment of *digestive disturbances in infants*. To half a liter of kefir he adds half a liter of water, and 5 c.c. of a 20 per cent. solution of sodium bicarbonate. This mixture, he claims, checks the fermentation. Its use should not be persisted in after the stools return to normal, as it is not sufficient for the child's proper nourishment.

Clock<sup>4</sup> reports 117 cases of *infantile diarrhea* treated by intestinal implantation of the *Bacillus lactis bulgaricus*. The treatment consisted of the administration of a pure culture of the true *Bacillus lactis bulgaricus*. 1 or 2 tablets were usually given every two or three hours; but, in severe cases, 2 or even 3 tablets were given every two or three hours *before* and *after* each feeding, making a total in some cases, of 42 tablets in twenty-four hours.

74 of the babies were continued on their respective milk diets; 23 babies, between the ages of fifteen months and two and a half years, were continued on their mixed dietaries of milk, soups, cereals, etc.; the remaining 43 babies were placed on a starvation diet of barley water for twenty-four to forty-eight hours, after which small quantities of boiled, skimmed, or whole milk were usually added to the diet. Improvement under this method of treatment was shown by three cardinal signs: (1) Gain in weight; (2) rapid change in character of stools

<sup>1</sup> Abstract, British Medical Journal, January 14, 1913.

<sup>2</sup> Indian Medical Gazette, November, 1912.

<sup>3</sup> Monatsschr. f. Kinderheilkunde, 1912, No. 5.

<sup>4</sup> Journal of the American Medical Association, July 19, 1913.

to normal color and consistency, regardless of their number; (3) improved general condition of the patients as evidenced by, first, improved appetite, second, subsidence of fever, third, abatement of vomiting, and fourth, better appearance.

In his conclusions, Clock emphasizes that the hygienic surroundings, or the intelligence of the mother had no influence, and that a starvation diet and purgation only result in loss of weight and strength, and the prolongation of the disease. He insists that in order to obtain the best results, a pure culture of the true *Bacillus lactis bulgaricus* must be employed, as the lactic acid bacilli isolated from other sources vary too much in their virulence and other characteristics. Furthermore, the culture must show only viable organisms.

Pouliot<sup>1</sup> recommends the local application of lactic acid bacilli in the treatment of *gangrenous and ulcerative patches*. He also insists on the use of the Bulgarian bacillus, as it produces the largest amounts of lactic acid.

Pouliot makes the observation that the internal use of lactic acid bacilli, if too long continued, leads to demineralization of the organism and hence invites *tuberculosis*. This is certainly questionable. I have used lactic acid bacilli either in tablet form or in milk in the treatment of tuberculous patients for some time, with undoubted benefit in many instances. So, too, Bartlett and Murphy<sup>2</sup> have found that in certain types of tuberculous patients, lactic acid soured milk is unquestionably of value.

Law<sup>3</sup> reports 5 cases of *pellagra*, in which marked improvement occurred from the administration of lactic acid bacilli tablets. Two tablets ( $7\frac{1}{2}$  grs.) were given, after each meal and at bedtime.

**Luminal.** Luminal, or phenyl-ethyl-barbituric acid, is a recently introduced sedative and hypnotic, which is closely related to veronal (diethyl-barbituric acid); it is a white, slightly bitter powder, almost insoluble in cold water. The manufacturers state that the maximum dose is 12 grains, and that this should not be exceeded.

Farnell<sup>4</sup> reports 2 cases, in which luminal was employed as a sedative to produce sleep, and in both of them there occurred distinct toxic symptoms, lasting from twelve to thirty-six hours. In both instances there was some vertigo, speech disturbance, unsteadiness in their gait, and ataxia. The knee-jerks were very much diminished, and the pupils dilated. In one of these cases the maximum dose of 12 grains was exceeded.

**Magnesium Sulphate.** As a prophylactic against the bites of various insects, flies, gnats, fleas, mosquitoes, Neal<sup>5</sup> recommends a solution of

<sup>1</sup> Revue Prat. d'Obstetrique et de Gynecologie, September, 1912.

<sup>2</sup> Boston Medical and Surgical Journal, September 5, 1912.

<sup>3</sup> Journal of the American Medical Association, July 5, 1913.

<sup>4</sup> Ibid., July 19, 1913.

<sup>5</sup> China Medical Journal, March, 1912; Therapeutic Gazette, September, 1912.

Epsom salts. His directions are as follows: Take one ounce of Epsom salts and dissolve in a pint of water; wet a cloth so that it will not drip, and rub the body well all over. Do not dry the wet surface with a towel, but allow it to evaporate. This will leave a fine powder over the surface of the skin. If the exposure near water or in woods is greater than usual, make the solution stronger and apply to the face, neck, and hands. Neal states that, in addition, the solution will aid in healing bites.

**Melubrin.** Melubrin is a white, odorless, almost tasteless, crystalline powder, readily soluble in water, but only slightly so in alcohol. In ordinary or even in large doses the drug is said to be non-toxic. In moderate doses, it is said to have almost no effect on the circulation or respiration. It acts as a powerful antipyretic, and is also analgesic.

Melubrin has been recommended for painful affections, such as *neuralgias*. It is also said to have effects similar to the salicylates in *rheumatism*.

The drug is administered in doses of from 15 to 30 grains, although much larger doses are advised in rheumatism. As much as 150 grains may be given daily.

Schrenk<sup>1</sup> reports on the use of melubrin in 31 cases of arthritis, including 24 typical cases of *polyarthritis rheumatica*. The action of melubrin is, in general, the same as one is accustomed to see with salicylic acid. For the most part, the pains subside rapidly, the temperature is lowered, and the swelling and redness of the joints subside in the course of a few days. As a whole, the effects produced by melubrin were less marked than those obtained with the salicylates.

There is no doubt, however, that melubrin is capable of curing acute rheumatism, without having to resort to the use of the salicylates. Schrenk holds this to be a distinct step in advance, as there is great need of a substitute for the salicylates in those instances in which the latter are badly borne.

The antipyretic action of the drug was also tested, principally in tuberculous subjects. He gave the melubrin to tuberculous patients for the purpose of reducing the temperature. The initial dose was  $7\frac{1}{2}$  grains. If there was no reduction from this dose it was increased, after a few days, to 15 grains, three times daily. Not infrequently a cumulative action resulted. If, therefore, the temperature reduction from the drug on the first day is not marked, it will, with the same dose, be much more pronounced on the second day.

Schrenk has administered in the neighborhood of 2500 grams of melubrin among about 60 patients. In no case has he observed any untoward effects.

**Mercury.** Hass<sup>2</sup> recommends the administration of bichloride of mercury to nursing mothers, when the nursling is suffering from any

<sup>1</sup> Deutsch. med. Woch., 1912, No. 34.

<sup>2</sup> Archives of Pediatrics, July, 1912.

**gastro-intestinal** disturbance. While not a specific for these conditions, Haas states that the treatment is not only harmless, but is one of the few drugs capable of influencing the metabolism of the mammary gland. In luetic cases with gastro-intestinal disturbances, the mercury, administered in this manner, probably exerts a specific effect even though the usual manifestations of syphilis are but slightly improved.

The drug is given to the mother in doses of  $\frac{3}{2}$  of a grain three times daily after meals.

The following case, cited by Fuller,<sup>1</sup> is of interest by reason of the fact that recovery took place after a dose of bichloride of mercury which would have proved fatal in the great majority of instances. The patient, a man, aged eighty-five years, swallowed, by mistake, a tablet containing  $8\frac{3}{4}$  grains of bichloride of mercury. The patient realizing the mistake at once, drank a glass of barley water. Seen a half hour later by a physician, he was given the white of an egg. Later, a stomach tube was passed and the stomach washed out with large quantities of albumen water and milk and water. There was an urgent desire for the bowels to move, but very little more than mucus was passed. The patient became extremely collapsed, was cold and pallid, and the pulse was almost imperceptible. He was stimulated with strychnine, hypodermically, and brandy by mouth. For some days his condition was critical, but after a prolonged convalescence his recovery was complete.

The recovery of individuals after lethal doses of a poison is sometimes difficult to explain. Much, undoubtedly, depends on the rapidity of absorption and the time which elapses between the ingestion of the poison and the administration of the antidote.

**Nitroglycerin.** Hewlett and Van Zwaluwenburg,<sup>2</sup> in a study of the pulse flow in the brachial artery, found that nitroglycerin, even in such small doses as one drop of a 1 per cent. alcoholic solution, placed on the tongue, usually produced marked changes in the form of the peripheral pulse. These changes began in two or three minutes, reached their maximum in five or six minutes, and passed off in fifteen minutes or more. The radial pulse became larger and fuller, and the pulse-tracings were quite characteristic.

Hewlett and Van Zwaluwenburg state that the changes in the brachial pulse flow produced by nitroglycerin are so characteristic that in going over a set of records the nitroglycerin tracings can usually be recognized with ease. Their main features are the large size of the primary wave, the marked negative wave immediately following, the large dicrotic wave, and the elimination of other secondary oscillations. They state that two explanations of the large nitroglycerin pulse seem possible: (1) It might be due to the manner in which the blood is expelled

<sup>1</sup> British Medical Journal, January 18, 1913.

<sup>2</sup> Archives of Internal Medicine, July, 1913.

from the heart. Thus a large systolic output, or a sudden emptying of the ventricle against a low arterial pressure, might cause a pulse wave of unusual height, which is propagated as such to the brachial artery. (2) The large pulse wave might be due to the relaxed condition of the larger vessels of the arm. This, they think, is the true explanation, as there is at hand positive evidence in favor of the view that the nitroglycerin changes in the brachial pulse of man are due to peripheral influences. In support of this they assert that they have repeatedly found that carotid tracings taken by tambours do not show these changes even when the brachial changes do. If this is true, as they believe, the relaxed condition of the arterial trunks leading to and distributed in the arm would permit a large undamped wave to enter the brachial artery.

Cornwall<sup>1</sup> gives the following general indications for the employment of nitroglycerin: (1) To relieve symptoms of localized *arteriosclerosis* or *arterial spasm* in vitally important regions of the body (such as disease of the coronary arteries), and when there is pain due to contracted or diseased arteries in other regions. (In this connection, it might be noted that C. L. Greene,<sup>2</sup> in an article on the treatment of *anginal pains*, expresses the view that the nitrites are of little value except in the briefest attacks. Momentary relief is certainly afforded by amyl nitrite in some, but not in all cases. While nitroglycerin and erythrol tetranitrate are apparently valuable in some cases of high tension, Greene states that he has never been able to satisfy himself of the advantages usually attributed to them.)

(2) To reduce general high blood pressure in selected cases, if its continuance threatens accidents to the cardiovascular apparatus.

(3) As an aid in diagnosis, Cornwall states that the drug can be employed to show whether certain symptoms are due to contracted arteries, or to some other cause. The symptoms which invite this test are chiefly pains and abnormal sensations in various parts of the body associated with elevation of the blood-pressure. It is his custom, if a patient with high blood-pressure complains of headache or other symptoms which might be due to localized arteriosclerosis, to put a hypodermic tablet of  $\frac{1}{100}$  of a grain of nitroglycerin under the tongue. In three or four minutes, if the headache is due chiefly to arterial contraction, relief is experienced.

Cornwall gives as the chief contra-indications to the use of nitroglycerin, a low or relatively low blood-pressure, advanced chronic nephritis with very high blood-pressure and toxemic conditions producing high blood-pressure, as a rule, and the presence of an idiosyncrasy in regard to its action. Furthermore, it should never be employed as a heart stimulant.

<sup>1</sup> Journal of the American Medical Association, July 12, 1913.

<sup>2</sup> Ibid., July 19, 1913.

In regard to the employment of the nitrites in the management of cases with high blood-pressure we have learned, since the modern methods of studying blood-pressure have been introduced, that the reduction of the pressure is not only not necessary in many cases, but may be even positively harmful.

Osler<sup>1</sup> recalls this in citing the case of an individual who, through worry over his condition, suffered a drop in his blood-pressure from 220 to 150. It was not until his nervous apprehension became quieted and his pressure rose to 180 that he felt better. Osler states that the nitrites may be used and are often of some temporary benefit, but that neither the nitrites nor potassium iodide are of a permanent benefit in arteriosclerosis.

McGraw,<sup>2</sup> writing on the management of hypertension, emphasizes the fact that internists more and more incline to the view that nearly every case of high tension is more or less compensatory, and that the indications for lowering it are few and far between. He sums up the management of high tension cases as follows: (1) It is a symptom, not a disease; so treatment should be directed toward the disease in which it appears; (2) it is usually compensatory, and it is better to reduce it indirectly than by direct dilatation of the arteries; (3) when it is necessary to lower the tension directly, as in angina or in threatened apoplexy, the blood-pressure should be carefully controlled by frequently taking records of the pressure, which should not be lowered beyond what may be considered normal limits for that particular disease and age.

Probably the most universally employed method of treating *hemoptysis* is the use of the nitrites. The two preparations most in use are nitroglycerin, first introduced by Flick, and amyl nitrite, first employed by Francis Hare. Frazer<sup>3</sup> recommends the following plan in dealing with pulmonary hemorrhage: Absolute physical quiet, reassurance of the patient and the employment of the nitrites in the form of amyl nitrite, together with  $\frac{1}{50}$  grain of atropin hypodermically. In place of the atropin, nitroglycerin may be administered hypodermically in doses of  $\frac{1}{100}$  of a grain, repeated every half hour or every hour, and then less frequently. A more lasting effect may be secured by the use of sodium nitrate in doses of 1 grain every three or four hours. Morphine, in Frazer's opinion, should not be resorted to as a routine measure. Personally, I believe morphine is the most useful drug we possess in this condition; not that it has any special effect either on the blood or the vessels, but because it does quiet the patient both physically and mentally.

If the bleeding has been at all severe, the diet should be restricted to

<sup>1</sup> British Medical Journal, November 2, 1912.

<sup>2</sup> Journal of the Michigan State Medical Society, May, 1913.

<sup>3</sup> Medical Record, November 9, 1912.

six or eight ounces of milk every three hours. An ice-bag serves no good purpose unless tachycardia is annoying.

**Phenol.** Whitfield<sup>1</sup> describes a quick and efficient method for the removal of the *pediculus capitidis*. He has used it with the greatest success for the past twelve years. It is especially valuable in females, in whom treatment is ordinarily difficult, because of the length of the hair.

The patient is laid on her back on the bed with the head over the edge, and beneath the head is placed a basin on a chair, so that the hair lies in the basin. A solution of 1 to 40 carbolic acid is then poured over the hair into the basin, and sluiced backward and forward until the whole of the hair is thoroughly soaked. It is especially necessary that care should be taken to secure thorough saturation of the hair over the ears and at the nape of the neck, since these parts are the sites of election of the parasites, and unless thoroughly treated are apt to escape the solution. This sluicing of the hair in the carbolic solution should be kept up for a full ten minutes. At the end of that time the hair is lifted out and allowed to drain, but is not dried or even wrung out. The head is then swathed, turban fashion, in a towel or piece of flannel, and allowed to remain in this state for an hour. At the expiration of the hour the hair can be washed or allowed to dry, as the carbolic, being volatile, quickly disappears. This method not only kills the pediculi, but the ova as well.

Whitfield states that there are no disadvantages in the treatment. While he has never seen carboluria develop, he would not advise its use in children under five.

*Gangrene resulting from the use of solutions of carbolic acid as a dressing* is becoming less frequent. The following cases reported by Moore<sup>2</sup> have several interesting features. The first case was that of a man who mashed the end of his left index finger. On the advice of a physician, he tied the finger up in a rag soaked in a solution made by adding two drops of pure carbolic acid to a glassful of water. The following morning the finger was black and numb. He continued to care for the finger himself, and four weeks later visited the Episcopal Hospital. The finger was black, desiccated, and shrivelled, with a distinct line of separation. Amputation was advised, but refused; later he consented to the removal of the finger at another hospital. Whether the solution was as weak as the patient said it was, is open to doubt. More carbolic acid, or less water may have been employed, or the solution may have evaporated.

The second case was that of a child, three years old, who had received a slight cut on one finger. The mother tied the finger up in a rag soaked in "phenol-sodique," a popular and much advertised household remedy. The next morning the skin of the finger was found to be black. On

<sup>1</sup> Lancet, December 14, 1912.

<sup>2</sup> Episcopal Hospital Reports, Philadelphia, 1913, vol. i.

examination at the hospital, however, it was noted that the deeper tissues did not seem to be involved, and following the use of simple sterile dressings, the skin sloughed off, leaving a healthy granulating surface which eventually completely healed. This case illustrates the value of delaying amputation in carbolic acid gangrene until the extent of the damage is clearly defined.

**Picric Acid.** The treatment of *burns* by means of a solution of picric acid has become the almost universal procedure. Aside from the markedly beneficial effect the drug has on the burned surface, it is, if properly used, free from danger. While it has generally been accepted that poisoning from its local use rarely occurred and a fatal result had never been recorded, it is now known that if carelessly used death may ensue.

J. A. Mitchell<sup>1</sup> reports an instance in which death occurred in a child, two years and three months old, who had been treated with a dusting powder furnished in a "first-aid" outfit. In this case a burn on the foot was dusted by the mother with the powder at intervals for fourteen days. Eighteen days after the accident a physician was consulted, and the following effects noted: The skin of the lower half of the left leg was of a bright yellow color. There was a large brownish-yellow patch on the right side of the trunk, and similar patches over the elbows and knees. The conjunctiva and skin generally had a dusky, yellowish tinge. The urine was of a brownish color, and micturition was frequent and apparently painful. The pulse was rapid, and there was also vomiting and a severe diarrhea. The child became stuporous and finally died on the twenty-second day after the accident. A sample of the dusting powder used was found, on analysis, to contain 17 per cent. of picric acid and 82 per cent. of boric acid. Other samples from similar "first-aid" outfits showed from 5.9 to 7.1 per cent. of picric acid. The article just quoted from vigorously condemns the practice of furnishing such "aids" to the public who are only too prone to practice "amateur doctoring."

Picric acid when used in the treatment of burns should not be used in a stronger solution than 1 per cent. Even after the use of this strength, untoward results have been noted. The symptoms of picric acid poisoning are a rapid pulse, papular or erythematous rash, and yellowness of the conjunctiva and skin. There may be vomiting and diarrhea. The urine is discolored and has been variously described as dark red, dark green, or port-wine color.

O. W. H. Mitchell<sup>2</sup> recommends a 1 per cent. solution of picric acid as a *skin disinfectant*. It is employed under the same circumstances as tincture of iodine for a similar purpose. Since employing this method, Mitchell has had no case of wound infection. The only objection to its use is the intense and tenacious staining.

<sup>1</sup> South Africa Medical Record, July 13, 1912.

<sup>2</sup> Annals of Surgery, August, 1912.

**Pituitary Extract.** *Pituitrin*, prepared from the posterior lobe of the pituitary body, is indicated when it is desired to raise the blood-pressure, slow the heart, promote diuresis, or excite uterine contractions. According to Malinowsky,<sup>1</sup> pituitrin seems to possess a happy combination of therapeutic qualities—utero-vasculo-heart tonic. In its action on the heart and bloodvessels, it resembles adrenalin, but possesses certain advantages over adrenalin. Although its action is not so intense in raising the blood-pressure, its effects are more lasting, and, in addition, it has an immediate stimulating effect on the heart, not only slowing but strengthening it. Unlike adrenalin it does not cause contraction of the kidney; on the contrary, following a slight temporary contraction, it produces a distention, thus increasing diuresis.

It is as an oxytocic, however, that pituitrin has achieved its greatest success. The reports on its use for this purpose have multiplied tremendously during the past few years; and they are all, almost without exception, unanimous in the statement that the drug is an exceedingly valuable addition to the resources of the obstetrician. Not only does pituitrin bring about strong, active uterine contractions, but it reproduces almost exactly what nature should do, namely, stimulates to-and-fro contractions, which are so desirable. Hare,<sup>2</sup> from a study of the literature, was unable to find that pituitrin possessed any unfavorable after-effects, either upon the mother or the child.

Fabre and Rhenter<sup>3</sup> emphasizes that pituitrin is indicated in *uterine inertia*, partial or complete, and that this is the only condition in which the drug should be employed. This is extremely important because pituitrin is now being used indiscriminately both for bringing on and for hastily terminating labor. Fabre and Rhenter withhold judgment in regard to the role of pituitrin as an *agent provocateur* in uterine contraction. Obstetricians of experience, with whom I have talked, take a decided stand against the use of pituitrin in any condition except uterine inertia with the os fully dilated. Used to bring on labor, or to stimulate a uterus in which the os is not dilated, exposes the patient to the danger of rupturing her uterus, because of the powerful contractions excited by the pituitrin.

Malinowsky<sup>4</sup> also emphasizes the fact that in the first stage of labor and in the presence of, or in the expectation of, rigidity of the os uteri, pituitrin must be most cautiously administered. He states that there is sufficient evidence in the literature already to make one hesitate to employ the pituitrin under these circumstances.

Pouillot and Vayssieres<sup>5</sup> give as contra-indications: nephritis, myocarditis, arteriosclerosis, pelvic contraction, or in any case in which there

<sup>1</sup> Zentralbl. f. Gynäk., 1912, No. 43.

<sup>2</sup> American Journal of Obstetrics, October, 1912.

<sup>3</sup> Bulletin de la Société l'Obstétrique et de Gynécologie de Paris, February, 1913.

<sup>4</sup> Loc. cit.

<sup>5</sup> Presse Médicale, 1913, No. 4.

is a disproportion between the head of the child and the width of the pelvis.

Clavier<sup>1</sup> states that with regard to the fetal presentation, that it is clear that the preparation is contra-indicated when there is a certainty that the accouchement cannot be accomplished with the force of the uterine contraction above. In a shoulder presentation, for instance, it would be a serious mistake to use pituitrin without a previous podalic version, but there is no danger after the version is accomplished if one wishes to avoid a too violent traction, which is a good practice.

When the child is large, and one wishes to determine a stricture (anteroposterior diameter  $7\frac{1}{2}$  per cent.) a more adequate procedure is required, such as classic Cesarean, pubiotomy, etc., or, in the case of a dead child, craniotomy. There can be no doubt that the violent muscular effort of the uterus to overcome great pelvic obstruction is apt to lead to accidents and the risk of rupture.

In the third stage of labor when uterine inertia is present and profuse bleeding occurs, pituitrin, according to Humpstone<sup>2</sup> is not to be depended on alone, as it causes intermittent contractions of the uterus. What is needed to control the bleeding is an agent which will cause a tonic contraction of the uterus, and, for this purpose, *ergot* still holds the first place. Pituitrin, however, is a valuable adjunct in bringing about prompt contraction, and in combating the shock which accompanies postpartum hemorrhage.

Humpstone states that pituitrin does not produce abortion even after full doses, 4 c.c. repeated on three successive days.

For the induction of labor during the middle period of pregnancy, Humpstone states that there is very little information available, although pituitrin does seem to hasten dilatation of the os after the introduction of the dilating bag. In cases which have gone to term or overtime, Humpstone has had little success in bringing on labor with pituitrin, even when given in large doses and repeated on three successive days. Hengge<sup>3</sup> also failed to bring about abortion with pituitrin. While the uterus was stimulated to some extent, the cervical canal remained closed.

As an oxytocic, pituitrin is given hypodermically. The usual dose is 1 c.c.

According to Malinowsky,<sup>4</sup> repeated doses are always effective. The second dose, if administered while the first one is still active, or afterward, always calls forth a new impulse.

The action of pituitrin begins in from three to seven minutes after an injection, and lasts for about one hour. Reynolds<sup>5</sup> states that uterine

<sup>1</sup> Le Scalpel, December 8, 1912.

<sup>2</sup> American Journal of Obstetrics, September, 1912.

<sup>3</sup> Münch. med. Woch., December 17, 1912.

<sup>4</sup> Loc. cit.

<sup>5</sup> American Journal of Obstetrics, October, 1912.

contractions begin in from fifteen to thirty minutes after being injected intramuscularly. It may be injected in the forearm, thigh, or abdominal wall.

J. H. Musser, Jr.,<sup>1</sup> reports some results in the continuous administration of pituitary extract when given by mouth. The investigation was undertaken to determine the effect on the *blood-pressure*, and at the same time to observe other phenomena, which might be attributed to the employment of the drug.

Eighteen patients were studied, with the following results: (1) Blood-pressure: 17 showed a rise in the systolic pressure, the greatest being 28 mm. of mercury. Usually a corresponding rise in the diastolic pressure occurred, though rarely it remained at the same height as before taking the extract, or even became lower. (2) Pulse-rate: The changes in the pulse-rate were inconstant; an increase was generally observed, though in two individuals the rate was decidedly decreased. (3) Diuresis: 6 individuals noted no diuretic effect. The extent, absence, or presence of this symptom could not be accurately determined. The urine showed no particular change except in one case. Glycosuria was never observed. (4) Intestinal tract: Diarrhea developed in 7 cases and 4 previously constive had daily movements during the period of taking the drug. (5) Subjective symptoms: 4 individuals were apparently much benefited by the rise in pressure and general stimulative effect of the glandular extract upon the unstriated muscle, and one person was benefited through the diuretic effect of the extract. In the remaining patients, there was little effect noted except by those who developed the rather annoying diarrhea.

Musser's conclusion is that the prolonged administration of extracts of the pituitary gland exert a distinct pressor effect upon the peripheral vascular apparatus, which persists for an appreciable time after discontinuance of the drug. This is apparently the only consistent effect following continued administration of the gland *per oram*; other results are variable and indefinite.

The preparation employed was the extract of the whole gland made up in 0.2 grain tablets containing 0.065 grain of the dried gland, equivalent to 0.26 grain of fresh gland. The dosage at first was 2 of these tablets twice a day, but no effect was noted until the dose was increased to one tablet four times a day.

Eberle<sup>2</sup> reports good results from the use of *pituitrin in urinary retention*. Besides its influence on the muscles and nerves of the bladder, pituitrin also possesses a diuretic action. Experiments have shown that an intramuscular injection of pituitrin will bring about evacuation of a full bladder, the time relation being in inverse ratio to the fulness of the organ.

<sup>1</sup> American Journal of the Medical Sciences, August, 1913.

<sup>2</sup> Zeitschr. f. gynäk. Urologie, 1913, No. 2.

Eberle calls attention to the fact that muscular stimulation of the bladder is induced by the injection of a small quantity of fluid when the organ is already full. The diuretic action of pituitrin in filling the bladder is analogous to this, and the secondary distention of the bladder wall in no small degree stimulates its now sensitive nerves, which in turn induce the organ to evacuate its contents. Thus, it may be said that pituitrin, if administered when the bladder is full, is an excellent means of combating retention of urine.

Jaschke<sup>1</sup> reports results on the use of pituitrin in a variety of plastic and other gynecological operations, with special reference to the bladder function. In 21 instances the bladder was spontaneously emptied on the day of operation, thus avoiding the necessity of catheterization; in 14 cases, spontaneous urination occurred on the second day; and in 5 cases there were no results.

In combating impending collapse during the administration of an anesthetic, MacKenzie<sup>2</sup> states that it is useless to give strychnine unless it is administered in practically poisonous doses. He advises, for this purpose, either pituitary extract or adrenalin.

Rist<sup>3</sup> reports good results in the arrest of *pulmonary hemorrhage* from the intravenous use of pituitrin. In 10 cases there was an immediate arrest of the bleeding, following the injection of the pituitrin. In some instances, the intravenous administration of the pituitrin in  $\frac{1}{2}$  c.c. doses is followed by pallor of the face, slowing of the heart, and a tendency to syncope. The symptoms are exceedingly fleeting and not attended by any untoward results. It would be wiser possibly, in most instances, to give the drug subcutaneously. Bernard, in discussing Rist's paper, confirmed his good results:

Several years ago adrenalin was highly recommended as an efficient agent in controlling pulmonary hemorrhage. It is rarely employed now. Inasmuch as pituitrin acts in much the same manner as adrenalin, further experience in all likelihood will demonstrate that it has very little influence in the control of hemoptysis.

Von Willebrand<sup>4</sup> reports on the use of pituitrin in 20 cases of *diphtheria* complicated by weakness of the heart and low blood-pressure. It acted effectively in all but 2 cases.

**Potassium Iodide.** Some years ago the use of iodide of potassium was advised in cases of suspected *tuberculosis*, but in which there was no sputum. The use of small doses of potassium iodide was, therefore, given in order to obtain sputum for examination purposes.

So many reports have been made condemning this method as being

<sup>1</sup> Münch. med. Woch., 1912, No. 3.

<sup>2</sup> Australasian Medical Gazette, September 21, 1912.

<sup>3</sup> Bulletins et Mémoires de la Société Médicale des Hôpitaux de Paris, April 24, 1913.

<sup>4</sup> Abstract, British Medical Journal, March 8, 1913.

dangerous, that it is surprising that anyone would use the drug in tuberculosis.

Rothschild,<sup>1</sup> however, has again recommended the procedure, although he admits that the method is not without danger. He gives the iodide because he believes that it promotes phagocytosis, and that the lymphocytes are particularly increased. By examining the sputum of patients to whom iodine is being administered, one can obtain important prognostic information. Thus in cases which respond to the iodine medication, there are many leukocytes in the sputum, and these have incorporated within them the tubercle bacilli. On the other hand, if toxemia is marked, and the outlook bad, the tubercle bacilli are not contained within the phagocytes.

Curle<sup>2</sup> reports results obtained in the treatment of tuberculosis by combining ionization with the internal administration of potassium iodide. At 9 A.M., 1 P.M., and 3 P.M. he gives 25 grains of potassium iodide and 5 grains of sodium bicarbonate in a copious draught of water. At 4 P.M., with the patient resting in bed, ionization is carried out by means of plates of block tin, thin enough to bend into hollows, each having a surface of 20 square inches, under which are placed 16 layers of lint, saturated with a warm 2 per cent. solution of potassium iodide. An electric current is then passed through the plates. The ionization gives the best results if given every four to seven days. This method is mentioned as an example of what not to do in the treatment of tuberculosis. Aside from the doubtful utility of the electric current, the method is to be condemned because of the large doses of iodide of potassium.

I am not prepared to say whether every case of pulmonary tuberculosis is injured by the internal administration of potassium iodide, but I do know that quiescent lesions are aroused to activity by the use of the drug sufficiently often to make its use questionable.

In the management of *asthma in children*, especially when the attacks occur only at night, E. B. Smith<sup>3</sup> recommends a mixture of potassium iodide, belladonna, and ethereal tincture of lobelia, to be given at bedtime. The mixture is made up in the following proportions:  $\frac{1}{2}$  grain of the iodide for each year of life; 2 to 10 minims of the tincture of belladonna from infancy to ten years of age; and lobelia in 1 minim doses for every year of life up to 5 minims. If the attacks occur both day and night, the same mixture in slightly smaller doses is given three times a day. The iodide should be given for from six to eight weeks and then omitted for a fortnight, and a tonic, such as arsenic, substituted. If the attack is very bad, the child may be put in a hot bath, or put in a croup tent and subjected to medicated steam, or an injection of from 3 to 5 minims of a 1 to 1000 solution of epinephrin may be administered.

<sup>1</sup> Deutsch. med. Woch., February 27, 1913.

<sup>2</sup> Practitioner, December, 1912.

<sup>3</sup> Medical Press and Circular, May 15, 1913.

For years the use of the iodides in the management of *arteriosclerosis* associated with high tension has been an accepted method of treatment. Of recent years, however, their use is being more and more restricted. Osler<sup>1</sup> has never seen any permanent benefit arise from the use of the iodides in cases with high blood-pressure, though now and then their prolonged use does seem to produce a marked lowering of the tension. Coleman<sup>2</sup> states that high-tension cases, which are of luetic origin, demand the use of the iodides; and in many cases which are not luetic the effect is distinctly good. While the use of the iodides is largely empirical, Coleman thinks they not only aid in keeping the tension low, but that they also retard sclerotic changes in the vessels. As our knowledge of arteriosclerosis increases, less and less reliance is being placed in drugs, except for symptomatic purposes, and more and more attention is being given to careful regulation of the patient's life.

Hodgkinson<sup>3</sup> confirms the statement, made some years ago by J. Mitchell Bruce, that iodide of potassium acts as an *antigalactagogue*. In those instances, in which, because of the death of the child, or any other cause, which requires an arrest of the secretion of the milk, Hodgkinson found that the iodide was most efficient. Furthermore, it has the advantage of not requiring any restriction of the diet, or the use of the commonly employed methods, such as painful massage, bandaging, the use of hot or cold applications, dirty belladonna plasters, and anodynes or exhausting cathartics.

In a majority of the 300 cases in which Hodgkinson has employed the iodide, one dose has usually been sufficient, while any pain or discomfort that may have been present disappears within five or six hours. Occasionally a second dose is needed. He employs the following formula:

R—Potassii iodidi . . . . .	gr. xxx to xl
Phenazoni (antipyrine) . . . . .	gr. x
Spts. ammon. aromat. . . . .	xxx
Syrupi . . . . .	5j
Aquaæ . . . . .	q. s. ad 5ij

This is administered as one dose, as soon as the breasts become swollen and painful, and, if necessary, repeated twenty-four to forty-eight hours later.

The antipyrine is included in order to counteract the headache which the large dose of the potassium iodide sometimes causes. The dose of the iodide is smaller for a woman who is weak and emaciated, than for a strong, plethoric one.

This treatment may be used also in the later stages of lactation, when

<sup>1</sup> British Medical Journal, November 2, 1912.

<sup>2</sup> Journal of the American Medical Association, November 30, 1912.

<sup>3</sup> Australasian Medical Gazette, September 14, 1912.

the child is weaned. According to Hodgkinson, the treatment has no disadvantages whatever.

**Potassium Permanganate.** Barton<sup>1</sup> discovered accidentally that the injection of potassium permanganate into the urethra and bladder caused a transitory but complete *desensitization of the mucous membrane of the urethra*, anterior and posterior, of such a degree and character as to permit of the painless passage of sounds. He followed up this original observation with several experiments. His subsequent studies showed that anesthesia of the mucous membrane of the urethra could be completely and satisfactorily produced by solutions of potassium permanganate in the strength of from 1 to 2500, or even 1 to 5000; weaker solutions are unsatisfactory.

The minimum limit of dilution to obtain satisfactory anesthesia, therefore, should not be less than 1 to 5000. The maximum limit of concentration should be governed by the fact that solutions in excess of 1 to 2000 should not be used in the posterior urethra.

Several years ago, potassium permanganate was heralded as an efficient antidote for poisonous *snake bites*. An enthusiastic advocate of this method of treating cobra poisoning has been Sir Lauder Brunton, and largely because of his interest in the matter, syringes charged with a solution of permanganate of potassium have been distributed widely throughout India in order that an injection might be given with the least possible delay after the bite was received. In addition, the investigations of Weir Mitchel and Reichert in this country indicated that the drug had a distinctly favorable influence in cases of rattlesnake poisoning. A doubt as to the efficiency of permanganate of potassium is now raised, however, by reason of certain investigations carried out by Mr. Bannermann,<sup>2</sup> the Surgeon-General of the Indian Medical Service. The result of Bannermann's studies are as follows: "If the venom is placed under the skin and the permanganate is applied in powder or injected, it seems to be of some little use, but if, as in the case of true snake bite, the poison is placed well below the skin into the loose fascia, permanganate seems to be of no value whatever; and if pure permanganate powder is rubbed into the wound, it frequently causes severe sloughing. If the patient is seen soon after the poison is injected by means of a hypodermic syringe, and then the part is treated by free incision and rubbed with the powder of permanganate, the method seems to have some value, but under ordinary circumstances, when the poison is deposited, not by means of the hypodermic needle, but by the fangs of the snake, it seems to be of no use whatever."

Rogers,<sup>3</sup> on the other hand, has also thoroughly investigated the permanganate treatment of snake bites, and, as a result, believes it

<sup>1</sup> Journal of the American Medical Association, July 19, 1913.

<sup>2</sup> Indian Medical Gazette, October, 1912.

<sup>3</sup> Ibid., December, 1912.

has saved a number of lives. Furthermore, he is convinced that it is the only practical method of treating snake bites under ordinary conditions of practice in India.

Whenever possible, this treatment should be supplemented with an intravenous injection of antivenin.

Campbell<sup>1</sup> reports 14 cases of snake bite treated with permanganate, all of which recovered but one. In this series, however, seven of the snakes were in all probability not poisonous, and three only slightly so. His results with cobra poisoning apparently confirm the opinion of Bannermann, for, in one instance, two ligatures were applied within three minutes and treatment with permanganate instituted within ten minutes after the patient had received a cobra bite, and yet death occurred.

**Prussic Acid.** It is well known that prussic acid produces death with extraordinary rapidity after it is ingested. Although recovery rarely occurs after a dose of any considerable size, it occasionally does happen, as in a case reported by Bourke.<sup>2</sup> His case was that of a soldier who attempted suicide by swallowing 2 drams of diluted hydrocyanic acid (B. P.). Almost at once he fell to the floor in a rigid, doubled-up condition, with difficult breathing, followed by convulsions, loss of pulse at the wrist, intense congestion of the face, and dilated pupils. The breath smelled strongly of the acid, and the respiratory act was arrested for some seconds.

He was at once given an emetic, artificial respiration, a hypodermic injection of  $\frac{1}{80}$  of a grain of atropin and inhalations of amyl nitrite. The emetic was unsuccessful, but the passage of a stomach tube resulted in slight vomiting. The recurring convulsions and muscular rigidity were combated with hypodermic injections of atropin and inhalations of amyl nitrite. Improvement followed after each injection and inhalation, and two hours later the patient became conscious and then rapidly recovered.

Stevenson (quoted by Bourke) states that the largest dose previously recorded, followed by recovery, was one fluidram of the diluted acid. He also stated that death followed doses of 2 drams or more, in from two to ten minutes.

**Salicylates.** Several papers have appeared, during the past year, on the toxicity of the different forms of the salicylates. Claims have also been made by manufacturers on the superiority of one form over another. Eggleston,<sup>3</sup> in a critical study of the literature, was unable to substantiate the claims of some manufacturers that salicylates made from natural oil are greatly superior to the synthetic forms; nor could he determine that the claims made against the artificial salicylates were

<sup>1</sup> Indian Medical Gazette, October, 1912.

<sup>2</sup> Journal of Royal Army Medical Corps, March, 1913.

<sup>3</sup> Journal of the American Medical Association, December 7, 1912.

well founded. In an investigation of the purity of commercial sodium salicylate, Hilpert<sup>1</sup> found that, except for some differences in the color of aqueous solutions, all the brands of sodium salicylate examined were essentially alike in properties and composition. More recently, Hewlett<sup>2</sup> reports the results of coöperative investigation undertaken at the instance of the Council of Pharmacy and Chemistry. "The result of the coöperative investigation as to the relative therapeutic value of sodium salicylate derived from natural sources and of sodium salicylate prepared by synthetic methods shows no essential difference between the two. This was demonstrated not only by the opinions of those investigators who attempted to classify the effects of their powders, but also by a study of all the reports submitted. The slight variations in one direction or the other, as shown by our figures, are such as one expects in any set of statistics. Indeed, the statistical variations in these figures are surprisingly small. Allowing, therefore, for statistical error, one must conclude that actual and synthetic sodium salicylates are indistinguishable so far as their therapeutic and toxic effects on patients are concerned."

In a study of the toxic effects of sodium salicylate, Hanzlik<sup>3</sup> investigated the clinical records of 409 patients, extending over a period of twelve years. The mean toxic doses of the two forms (synthetic and natural) for males and females, respectively, were as follows: 180 to 140 grains of the synthetic sodium salicylate; 200 to 135 grains of the natural sodium salicylate; 120 minimis of methyl salicylate or oil of gaultheria; 165 to 120 grains of acetylsalicylic acid or aspirin; 100 to 83 grains of salicylosalicylic acid.

Hanzlik's study did not show that there was any essential difference between the artificial and natural forms of the drug.

Stockman<sup>4</sup> reviews the action of the various salicylates in the treatment of *rheumatism*. He sees no superiority in salicylic acid over sodium salicylate, and, if the latter is given in a mixture suspended in mucilage, gastric irritation is not likely to occur. In sufficient doses (90 to 160 grains in twenty-four hours), sodium salicylate is very efficient in rheumatism, if begun early and if the infection is recent and confined to the joints. If, however, the tissues of the heart valves, or if the muscle or other parts are implicated, the drug is not so effective. Such cases are apt to continue for weeks with the recurrence of symptoms in spite of treatment.

In a simple uncomplicated case, about an ounce of sodium salicylate given over a period of two to four days is effective in abolishing symptoms, but this will not kill the infecting organisms, and hence relapses

<sup>1</sup> Journal of the American Medical Association, April 12, 1913.

<sup>2</sup> Ibid., August 2, 1913.

<sup>3</sup> Cleveland Medical Journal, April, 1913.

<sup>4</sup> British Medical Journal, March 22, 1913.

are apt to ensue, unless the administration of the drug is continued for about three weeks longer. In order to sterilize the body quickly, the intravenous administration of sodium salicylate has been advocated, but is hardly practicable. For the same purpose, large doses by mouth (500 to 600 grains in twenty-four hours) have been advised. Aside from the danger of producing acidosis, Stockman is doubtful as to whether sterilization can be accomplished in this way.

*Salicin* in 20-grain doses every hour, or 30 grains every two to three hours, is very satisfactory. In some instances, Stockman has given as high as 60 grains and repeated it in two hours without any ill effects.

While *aspirin* (acetyl-salicylic acid) is efficient in lessening non-rheumatic pains, it is inferior to sodium salicylate in true rheumatism. Furthermore, it is more irritant to the stomach, cannot be combined with sodium bicarbonate, and, if pushed to large doses, causes uncomfortable untoward symptoms.

*Salol*, given in doses of 10 to 15 grains every six hours, caused no improvement in rheumatic cases. It has the serious drawback of readily producing deafness and ringing in the ears.

*Methyl-salicylate* in 10 to 15 grain doses every three or four hours is effective, but is apt to cause nausea and vomiting. For local application, methyl-salicylate is the most used and the most efficient of the salicylates. It rarely irritates the skin and can be rubbed in, or applied to the inflamed joint either undiluted, or in the proportion of three parts of methyl-salicylate to one of olive oil.

A number of other salicylate products (saligenin, glycosal, salicyluric acid, dimethyl-salicylic acid, etc.) are also mentioned, but none of them are to be recommended in place of the sodium salicylate.

**Sodium Bicarbonate.** Sodium bicarbonate in large doses has been lauded very highly of recent years in the management of *diabetic coma*. Hanssen<sup>1</sup> believes that while it may arrest the coma, its effect is only temporary, and that sooner or later the coma is sure to return.

He reports 15 cases, and in those in which the disease was most marked, albuminuria was a constant finding, but, in all of them, it subsided under the use of the alkali.

He gives the postmortem findings found in 8 coma cases. Extreme hyperemia and edema of the meninges were found in every case, and in five instances there were hemorrhages.

**Sodium Carbonate.** Nock<sup>2</sup> recommends sodium carbonate in the treatment of *ring-worm*. He obtained the information as to its efficiency in this respect from a woman, who for many years had had charge of waifs and strays.

Take a piece of sodium carbonate (ordinary household washing soda), about the size of a walnut, and hold it against a hot iron, such as a

<sup>1</sup> Wien. klin. Woeh., October 17, 1912.

<sup>2</sup> British Medical Journal, March 8, 1913.

poker heated in an open fire. The melted end of the piece of sodium carbonate is then freely rubbed into the ring-worm, especially if it is in the scalp, which should have the hair surrounding the lesion cut short. One application is usually sufficient on the body, but, if the head is involved, it may be necessary to repeat it six or seven days later.

Nock states that the treatment is practically painless, leaves no permanent mark, and, so far, has never proved unsuccessful.

**Spartein Sulphate.** Spartein sulphate is little used at present. The drug is worth keeping in mind, however, as it is an excellent cardiac stimulant, and sometimes effects a good result when other measures have failed. Wolverton<sup>1</sup> believes it to be our most reliable heart stimulant. To obtain the best results, Wolverton recommends that the drug be administered in doses of from 1 to 2 grains every two to six hours. In urgent cases, it is best to give 2 grains hypodermically and repeat in two hours.

In many text-books the dose of spartein sulphate is given as low as  $\frac{1}{6}$  to  $\frac{1}{2}$  of a grain. This is entirely inadequate. The minimum dose should rarely be under 1 grain.

**Strychnine Sulphate.** In the management of the *retention of urine* accompanying advanced stages of progressive paralysis, Taddei<sup>2</sup> recommends the hypodermic injection of strychnine. He gives from four to twelve injections, each 0.02 c.c. of a 1 to 1000 solution, commencing at the first indication of retention of the urine and stopping the drug as the tendency to retention subsides. As the symptoms recur, the treatment is again resorted to.

Hartenberg<sup>3</sup> advocates the hypodermic use of strychnine sulphate in all cases manifesting nerve insufficiency, as, for example, *neurasthenia*, convalescence from severe disease, *anemia*, *diabetes*, etc. To obtain the best results, the dose must be gradually increased until evidence of intolerance occur. This method of treatment is contra-indicated in cases of high blood-pressure, delirium, and spasmoid contractures. Hartenberg states that there is no danger from the progressive administration of the drug.

Marvin<sup>4</sup> did not observe any marked effect on the respiratory rate from the use of strychnine, although at times  $\frac{1}{20}$  of a grain would slightly accelerate the rate. As to its action on the heart, he noted a marked increase in the blood pressure from  $\frac{1}{30}$  to  $\frac{1}{20}$  of a grain; no effect occurred after the use of  $\frac{1}{40}$  of a grain.

**Sulphuric Acid.** J. Reynolds and R. J. Reynolds<sup>5</sup> recommends the internal administration of dilute sulphuric acid (B. P.) in the treatment

<sup>1</sup> Merck's Archives, March, 1913.

<sup>2</sup> Polyclinico, January 12, 1913; Journal of the American Medical Association, March 8, 1913.

<sup>3</sup> Presse Médicale, January 25, 1913.

<sup>4</sup> Archives of Internal Medicine, April, 1913.

<sup>5</sup> Lancet, March 15, 1913.

of carbuncles, boils, staphylococcic and streptococcic infections. They give the dilute form of the acid in 20 to 30 minim doses diluted with 2 ounces of water every four hours. Its action in a case of carbuncle is described as follows:

Within twenty-four hours the infiltrated area becomes strictly circumscribed; then the slough is observed to soften; during the next few days pus is discharged freely, the affected area shrinks, and granulation tissue forms, which gradually fills up the cavity. Complete cicatrization occurs in a comparatively short time, depending, of course, on the size of the lesion. The only external application is a dressing of phenolized petrolatum.

They also found the internal administration of dilute sulphuric acid useful in cases of *bronchiectasis* and *pulmonary tuberculosis*; the sputum becomes less purulent and much less in quantity, and in the tuberculous patients the fluctuations of temperature are less.

**Sumbul.** Sumbul has been recommended in a variety of conditions, but more especially as a *nervous sedative*. Macht<sup>1</sup> undertook a clinical study of the drug, paying particular attention to its effects in the neuroses of the menopause. Some observers have recommended the drug highly in these conditions, especially the "hot flushes" of which women so frequently complain at that period of life.

Macht failed to note any good effects from the use of sumbul so far as the neuroses of the menopause were concerned. Furthermore, he was unable to see that the drug produced any physiological action whatever. He believes that the ordinary commercial variety of sumbul on the market is useless, inert, and needlessly expensive; and furthermore, that it should be removed from the official list of drugs in the *Pharmacopoeia*.

**Thymol.** Thymol has pretty well proved its efficiency in the treatment of *hook-worm* infections. Leys<sup>2</sup> recommends the following procedure: If one is called upon to examine a large number of persons, whose age and condition would warrant the full dosage, and where it would not be practicable to count all the parasites expelled:

(1) Diagnosis by scanning three slides representing nine portions of a natural stool.

(2) Course of treatment: First day in bed, light liquid diet; one ounce Epsom salts at 10 A.M. Second day in bed, thymol finely triturated in capsules, grains 30, at 6, 7, and 8 A.M.; one ounce Epsom salts at 10 A.M. Save all stools and count parasites.

(3) If 150 parasites or more are found 3 more courses of treatment are likely to be required at intervals of ten to fifteen days; if 50 parasites or more are found, 2 more courses are required; if fewer than 50 parasites are found, 1 more course is needed.

<sup>1</sup> Therapeutic Gazette, November, 1912.

<sup>2</sup> United States Navy Medical Bulletin, January, 1913.

**Thyroid Extract.** Thyroid extract has been used in the past in the treatment of *obesity*, although such a procedure has not received general approval. Jump<sup>1</sup> however, is of the opinion that there is a distinct field for the extract in certain cases of obesity: namely, the constitutional or thyrogenous obesity, where there is a small or inactive thyroid and poor katabolism. It may also be given with care to the obese individual who is too fat to exercise, in order to reduce his weight to a point where he may exercise. He points out that formerly, owing to a lack of standardization in the preparations of the gland on the market, there was a considerable amount of confusion as to its proper dose. Thus one maker's preparation was about the strength of the present official preparation, another's was two and a half times as strong, while still another's was five-sixths as strong. Now there is the official glandulæ thyroideæ siccæ, 1 grain of which represents 5 grains of the fresh gland, and practically all pharmaceutical houses follow this standardization. Jump advises beginning with small doses of a fresh preparation of the dried gland,  $\frac{1}{2}$  to 1 grain three times daily, and gradually increase it, being watchful for the first signs of intolerance. The diet should contain an increased quantity of proteids in order to save the tissue proteid and a decreased quantity of carbohydrates to prevent glycosuria. While exercise may be dispensed with, it is valuable in that it trains the patient in this important particular. While taking the thyroid, the patient should be under constant observation and should never be allowed to take the drug without advice. If during the administration of the extract the pulse rises above 100, and the patient complains of breathlessness and weakness, the thyroid should be stopped at once and arsenic in small doses given. When relieved of the symptoms of intolerance, the thyroid may be resumed, but the dosage should be reduced. While the patient may relapse when the thyroid is stopped, especially if he relaxes in the observance of his diet and exercise, the same can be said of other methods. In most instances, it is necessary to return to the treatment from time to time.

Because of the diuretic action of thyroid extract, its effect in checking the progress of arteriosclerosis and its destructive action on effete products, Jump thinks it should be of service in cases of interstitial nephritis in which the patients are too fat. He states that he has had under his care for some time two such individuals who have been kept fairly well by this treatment. This statement is especially interesting because about a month after the publication of Jump's paper, Percy<sup>2</sup> published a preliminary statement on the use of thyroid extract in the treatment of *nephritis*. Percy has treated 35 cases of nephritis with thyroid extract with the most gratifying results; 2 of these cases he reports in detail. He calls attention to the uselessness of most of our

<sup>1</sup> Pennsylvania Medical Journal, October, 1912.

<sup>2</sup> Journal of the American Medical Association, November 9, 1912.

methods in dealing with a damaged kidney. He was led to the use of thyroid extract because the first patient to whom he administered it had a cystic goitre. The extraordinary results which followed the use of the extract led to its employment in other cases and always, according to Percy, with the same gratifying results. Following the administration of from 20 to 30 grains of the extract a day, the urine increases in quantity, the urinary solids gradually return to normal, the albumin and casts disappear, and the blood-pressure becomes lower. The urine becomes free from albumin and casts in from four to six weeks.

Percy advises, when the blood-pressure is high as the result of pathological hypertonia, in patients under sixty years of age, to add to the thyroid treatment  $\frac{1}{100}$  of a grain of nitroglycerin every two hours. In patients past sixty years, he adds to the thyroid and nitroglycerin, potassium iodide, grains 40, in twenty-four hours. He makes no change in the ordinary diet of the patient. Reports from other observers on this method of treatment will be looked for with great interest.

Brush and Cornell<sup>1</sup> report an interesting case of *myxedema* in a woman with notes on her condition seven years after recovery. When first seen, in 1905, she presented a typical picture of myxedema. Under thyroid administration, recovery was fairly rapid and complete. Four months after her discharge from treatment she resumed her position as a stenographer, and has kept steadily at work ever since. For the first few years she took the thyroid without interruption, but recently has omitted it for two or three days and taken it for a like period.

Zuber<sup>2</sup> reports a similar case, that of a boy, who, at the age of eight years, was the size of a child of two years. Under thyroid treatment he rapidly recovered, and is now a normal boy of fifteen years. In the discussion of this paper, it was pointed out that at times the improvement becomes stationary under thyroid and that it is then useful to combine the extract of other glands with the thyroid. For this purpose, hypophysis extract and epinephrin were recommended.

Schloessmann<sup>3</sup> advises the extract of fresh thyroid gland for the control of hemorrhage in *hemophilia*. He places the extract on the bleeding point for from five to ten minutes. Attempts to administer the extract internally, or by subcutaneous or intravenous injection did not succeed, and, besides, untoward effects were not infrequently observed.

**Tuberculin.** To properly digest and weigh the evidence annually presented for or against tuberculin therapy is a difficult task. No matter what one's own opinion is in the matter, it is unlikely to meet with the approval of those it opposes. Tuberculin therapy has now been before the medical profession for twenty-three years, and barring

<sup>1</sup> Archives of Internal Medicine, May, 1913.

<sup>2</sup> Bulletins de la Société de Pédiatrie, February, 1913.

<sup>3</sup> Beiträge zur klinischen Chirurgie, August 12, 1912.

the perhaps unjust condemnation it encountered the first year or so, it is still the subject of controversy. Its present status in the treatment of pulmonary tuberculosis is well depicted in the following quotation: "Notwithstanding the universal use of tuberculin for the past five years, opinion as to its value as a therapeutic agent is as divided as ever. The number of tuberculins has increased, the methods of administration have altered, the dosage has changed, and still we have nothing offered but impression,—on the one hand, of those who favor it, and, on the other hand, of those who discredit it—and, in the last analysis, very little positive proof one way or the other" (White and Van Norman<sup>1</sup>). Surely a remedy which has been on trial for twenty-three years, which has been employed in thousands of cases and by a host of observers, should have definitely established its usefulness long ere this.

In going over the literature of the past year, one encounters the same "impressions." And if there are more favorable to its use, it is in a measure explainable, on the ground that those who are opposed to its use have ceased publishing their objections.

Hastings<sup>2</sup> gives a list of 29 different tuberculins now on the market, but says that it is safe to state that the tuberculins known as O. T. (old tuberculin, Koch's original, 1890), T. R. (rest tuberculin, Koch, 1897), B. F. (broth, filtrate, or Denys' tuberculin, 1905), and B. E. (bacillary emulsion, Koch, 1901) are those to be recommended.

One of the curious features of tuberculin therapy is that it has never been used, to any extent at least, in the treatment of cattle. Shaw<sup>3</sup> states that it has never been shown experimentally that tuberculin has produced changes which are curative. Haupt<sup>4</sup> has reviewed the conflicting results of various workers in experimental tuberculosis, and gives some results of his own. He inoculated rabbits and guinea-pigs with small doses of tubercle bacilli, and then applied tuberculin treatment, approximating, as closely as possible, clinical conditions. His results were practically negative.

As to clinical results, the following are among those who report favorably on the treatment: Raw,<sup>5</sup> Wilkinson and Bennett,<sup>6</sup> Tillsch,<sup>7</sup> G. B. Dixon,<sup>8</sup> Francine and Hartz,<sup>9</sup> W. C. White<sup>10</sup> and Sahli.<sup>11</sup>

<sup>1</sup> Transactions of the National Association for the Study and Prevention of Tuberculosis, 1912.

<sup>2</sup> Journal of Outdoor Life, April, 1913.

<sup>3</sup> British Medical Journal, May 3, 1913.

<sup>4</sup> Beitr. f. Klin. d. Tuberkulose, 1912, Band xxiii, No. 4.

<sup>5</sup> British Medical Journal, February 1, 1913.

<sup>6</sup> Practitioner, January, 1913.

<sup>7</sup> Norsk Magazin for Lægevidenskaben, June, 1913; abstract, Journal of the American Medical Association, July 12, 1913.

<sup>8</sup> British Medical Journal, April 19, 1913.

<sup>9</sup> Journal of the American Medical Association, March 8, 1913.

<sup>10</sup> Journal of Tropical Medicine and Hygiene, August 2 and 13, 1913.

<sup>11</sup> Ibid.

Of these contributions, Raw's is entitled to the most consideration, as it relates to over 600 patients and a number of years' experience. Tuberculin, he says, is not going to revolutionize the treatment of tuberculosis. But in his opinion the best treatment we can offer today to a person infected with tuberculosis is a prolonged open-air life, preferably in a well-conducted sanatorium, excess of nutritious food, gentle exercise, followed by plenty of rest, and a course of tuberculin, by a careful physician.

Lawrason Brown's<sup>1</sup> observations lead him to believe that incipient cases treated with tuberculin do somewhat better than those not so treated, while the moderately advanced cases do much better. Other observers believe, however, that it is in the purely tuberculous conditions, and before secondary infections have occurred, such as incipient tuberculosis and surgical tuberculosis, that tuberculin is best suited (Hastings, *loc. cit.*; Raw, *loc. cit.*, etc.).

As to ultimate results, Brown holds the view that both incipient and moderately advanced cases which have been treated by tuberculin show less tendency to relapse. This opinion is also held by others, but there is as yet no substantial proof that such is the case.

Tillisch<sup>2</sup> holds that the proper case for the exhibition of tuberculin is the torpid form, in which the process remains nearly stationary from month to month.

The strongest argument in favor of tuberculin therapy is that it hastens the disappearance of the tubercle bacilli in the sputum. By some, this is the chief argument in favor of its use. Tillisch reports 91 patients given systematic tuberculin treatment and over 50 per cent. lost the bacilli from the sputum. This occurred in 7 out of 9 in the first stage, 17 out of 27 in the second stage, and 10 out of 34 in the third stage. If anything approximating these results could be obtained in every series, it would constitute a strong incentive for every one to employ the treatment. As in other phases of the treatment, however, there is not a unanimity of opinion.

Wilkinson,<sup>3</sup> the originator of the tuberculin dispensary, firmly believes that there is no better, more economical, and more effective method of dealing with tuberculosis in the masses than through the establishment of these agencies. In order to be successful, however, Wilkinson insists that the tuberculin must be administered by men specially trained in its use.

Sahli<sup>4</sup> states that all tuberculins are essentially the same, and that the apparent differences are dependent on the various degrees of admixed impurities. He is a warm advocate of the use of tuberculin, especially in the early cases of pulmonary tuberculosis, before the organism is under the influence of absorbed tuberculin.

<sup>1</sup> American Journal of the Medical Sciences, October, 1912.

<sup>2</sup> Loc. cit.

<sup>3</sup> Loc. cit.

<sup>4</sup> Loc. cit.

The opposite view in regard to tuberculin therapy is shown in the following communications: Barnes<sup>1</sup> reports on 150 cases of pulmonary tuberculosis treated with tuberculin. In this analysis he matched each one of the 150 patients taking tuberculin against another patient of the same classification, according to the National Association, and also anatomically, according to Turban. They were also matched, so far as possible, as to the presence of tubercle bacilli in the sputum, temperature, pulse, respiration, general conditions, weight, race, and year of discharge from the sanatorium. While no pretence was made that the two classes were exactly matched in prognosis, no pains were spared to carry on the method as completely as possible. His results are shown in the following tables:

The condition on admission was:

TABLE I

	With tuberculin.	Without tuberculin.
Incipient . . . . .	10	10
Moderately advanced . . . . .	137	137
Far advanced . . . . .	3	3
Total . . . . .	150	150

The condition on discharge is shown in Table II:

TABLE II

	With tuberculin.	Without tuberculin.
Apparently cured . . . . .	13	11
Arrested . . . . .	80	51
Improved . . . . .	38	61
Unimproved . . . . .	19	27
Died . . . . .	0	0
Total . . . . .	150	150

About 60 per cent. of the patients have been discharged over four years, and 86 per cent. over three years. The present condition of these patients is shown in Table III:

TABLE III

	With tuberculin.	Without tuberculin.
Well . . . . .	47	43
Living and working . . . . .	14	20
Living . . . . .	23	19
Dead . . . . .	66	68
Total . . . . .	150	150

<sup>1</sup> Transactions of the National Association for the Study and Prevention of Tuberculosis, 1912.

This table is, I think, very striking. It becomes more so when we consider that the average stay in the sanatorium of the tuberculin treated patients was six months longer than the untreated.

In conclusion, Barnes states that while other observers, using other methods of tuberculin administration (he employed small doses gradually increased), and with more prolonged treatment, may get different results, as established by equally thorough statistics, this analysis furnishes no evidence that these 150 patients, taken as a whole, were influenced by the tuberculin treatment.

Frederick Smith, of the Government Sanatorium at Fort Stanton, New Mexico, in discussing Barnes' paper, stated the medical officers who administered tuberculin at the sanatorium, unanimously agreed that there was no evidence that tuberculin in any way influenced the general course of the disease in any of their patients.

As Barnes put it in reply to those who upheld tuberculin therapy, the burden of proof is on the man who uses tuberculin; as he must furnish careful logical and correct statements, and accurate statistics that it is of decided benefit.

Rigg<sup>1</sup> reports observations on a comparison of afebrile cases of pulmonary tuberculosis treated for three months, half with tuberculin and half without, the cases being compared at the beginning and the end of this period. The net result of his observations showed that the administration of new tuberculin by one of the more popular approved methods, was not followed by greater improvement in the physical signs, nor by greater increase in weight, nor by more greatly increased capacity for physical work, nor by a greater improvement in the general condition, as compared with the results of ordinary hospital methods. Furthermore, his observations did not support the idea that tuberculin in any way lessens the activity of a local lesion.

Bardswell,<sup>2</sup> in reporting a small series of tuberculin-treated patients, states that, so far as immediate results were concerned, he was unable to detect any difference whatever in the progress of the tuberculin-treated patients, as compared with the progress of similar types of patients who, living under precisely similar conditions, were not having tuberculin.

Considering only the 17 cases whose treatment extended over periods ranging from a minimum of seven weeks to a maximum of twenty-five weeks, the ultimate results were as follows: Of 12 cases of moderately advanced disease, after a period of five years since discharge from the sanatorium, 4 (or 33 per cent.) are well and the remainder are dead. Of those who have died, 2 lived for over four years, 3 lived for over three years, 2 lived for over one year, and 1 lived three months only after discharge. 2 of the 4 patients who are well, lost their bacilli before

<sup>1</sup> British Medical Journal, February 1, 1913.

<sup>2</sup> Lancet, January 4, 1913.

they left the sanatorium. The 5 cases of very advanced disease all died within twelve months of their discharge.

These results, as a matter of fact, compare somewhat unfavorably with the ultimate results of comparable cases treated in the sanatorium during the same period without the tuberculin. Bardswell's conclusion is that the tuberculin, from a clinical point of view, was a negligible factor, and in nowise influenced either the immediate or the ultimate prospects of the patients to whom it was given. The number is too small, however, to be of great importance.

Tuberculin is usually advised in afebrile cases only, although there are some who maintain that at times it will reduce a persistent slight fever. Fowler<sup>1</sup> asserts that the use of tuberculin in any form in the treatment of pulmonary tuberculosis is not free from danger. Even with exceedingly small doses, which are gradually increased, a reaction may be produced. He believes that its use in febrile cases is absolutely inadmissible. This being the case, its field of usefulness is necessarily very restricted. To continue tuberculin in spite of reactions is, in Fowler's opinion, not only unjustifiable but dangerous to the life of the patient. Focal reactions are also dangerous as they cannot be controlled.

The question of dosage and its dangers is one of the many unsettled points regarding tuberculin therapy. The majority of observers are adherents of the school which advocates a small initial dose, and a very gradual increase, avoiding reactions at all costs. A small group believe in larger doses at longer intervals, with the idea of producing a slight reaction, especially a focal reaction. Fowler, as I have already pointed out, is much against this practice. Sahli also is opposed to any approach to a reaction, and it is on this ground that he disapproves of the subcutaneous injection of tuberculin for diagnostic purposes, namely, that it may arouse into activity a lesion which is quiescent. For the same reason, Rigg<sup>2</sup> also objects to the subcutaneous use of tuberculin for diagnostic purposes, especially for the purpose of detecting cases of so-called "closed tuberculosis." I might add that Bushnell, of the Government Sanatorium in New Mexico, has also condemned the subcutaneous use of tuberculin for diagnosis, as he has seen a number of quiescent cases aroused into activity by this method.

W. C. White and Van Norman,<sup>3</sup> on the other hand, have seen no benefit from the use of small doses gradually increased. They believe in the production of a slight reaction and state that while a small percentage of cases have a feeling of lassitude for a few days, that this is followed by a feeling of improving strength and well-being for ten or twelve days. They gauge the dose by a preliminary skin test, the

<sup>1</sup> *Journal of Tropical Medicine and Hygiene*, August 2 and 13, 1913.

<sup>2</sup> *Lancet*, January 11, 1913.

<sup>3</sup> *Transactions of the National Association for the Study and Prevention of Tuberculosis*, 1912.

details of which they have previously published. Dixon<sup>1</sup> does not believe that anything need be expected from the administration of small doses, given for a short period of time, unless such a course is secondary to a previous full course, or unless it is to be repeated.

A conservative estimate of tuberculin therapy in pulmonary tuberculosis might be expressed as follows: In the great majority of patients it produces no effect either for good or evil; a few may be harmed and a few seem to be benefited. As yet there is no way of telling beforehand which cases will be harmed and which will be helped.

Turning now to the use of *tuberculin in surgical tuberculosis*, we find there is much less confusion and a more uniform agreement as to its advantages. The one form of tuberculosis that seems particularly benefited is that involving the eye. Ophthalmic surgeons are, as far as I know, unanimous in this. Genito-urinary tuberculosis and tuberculosis of the lymph nodes are also greatly benefited.

Förster<sup>2</sup> is of the opinion that *surgical tuberculosis in children* is an especially fine field for tuberculin therapy. As children with surgical tuberculosis are exceptionally susceptible to tuberculin, Förster advises as an initial dose not over one or half a millionth of a milligram. His best results were invariably attained in the cases showing a marked reaction to the von Pirquet test.

Koepp<sup>3</sup> has noted in the case of swollen and hard *lymph nodes* that they tended to decrease in size following a von Pirquet test, and that, furthermore, the general condition of the patient improves. He recommends this as a therapeutic measure in all cases where the lymph nodes are swollen and hard, and the von Pirquet reaction is strongly positive.

Whiteside<sup>4</sup> and Coleman<sup>5</sup> report favorably on the employment of tuberculin in *genito-urinary tuberculosis*. Whiteside gives the details of 4 cases, all of whom were markedly benefited by a course of tuberculin treatment.

Coleman's views on *tuberculosis of the kidney* are as follows: While tuberculin will not cure tuberculosis of the kidney, it is a valuable adjunct combined with other methods of treatment.

Operable cases are unsuited to the treatment, but early cases, in which tubercle bacilli can be demonstrated, and without suppuration or impairment of function, are suited to tuberculin treatment until such a time as the symptoms present indications for nephrectomy.

Tuberculin is also worthy of trial in cases of renal tuberculosis, following nephrectomy, when tuberculous foci still remain in the urinary

<sup>1</sup> Loc. cit.

<sup>2</sup> Beitr. z. Klin. d. Tuberkulose, 1912, Band xxv, No. 1.

<sup>3</sup> Zeitschr. f. Kinderheilkunde, 1913, Band vii, Nos. 1 and 2.

<sup>4</sup> Journal of the American Medical Association, December 21, 1912.

<sup>5</sup> Ohio State Medical Journal, May, 1913.

tract, or in other organs. Early involvement of the lower genital tract, is certainly improved by tuberculin therapy, although any influence exerted on the morbid focus in the sense of a cure has not been demonstrated. Inoperable cases are scarcely influenced by tuberculin, but may be tried in the absence of other therapeutic means. Coleman cautions against the use of tuberculin unless there is an accurate knowledge of its action. He especially warns against following the directions furnished by manufacturers, or the placing of any dependence on serial dilutions already put up.

**Vaccine Therapy.** Vaccines in the treatment of disease are at the present time on trial. As yet, their limitations are not fully understood. A masterly review of the subject has been made by Theobald Smith,<sup>1</sup> who briefly summarizes the points to be emphasized as follows:

"All parasites tend to increase the resistance of the host in which they live and multiply. Out of this universal fact a number of practical problems arise. In any given disease is it worth while to try to raise this immunity, and how much energy will it cost the patient? If worth while, what is the best and most sparing way of raising such immunity artificially? In any localized infection, we must ask: Is this a beginning process without attendant immunity, or is it a residual process associated with general immunity? If the latter, vaccines may be considered safe. In processes associated with fever and bacteriemia, science says: Hands off until we know whether we have a progressive disease with gradual undermining of the resistance, or a more localized affection in which the excursions into the blood are secondary. In any case, the use of vaccines in these cases must be regarded as experimental, and should not be undertaken save in conjunction with one trained in immunological problems.

"Judged from this point of view, as well as from the work of the laboratory as a whole, we should say that vaccines applied during disease will be rarely, if ever, life-saving, but they may hurry a stationary or languid process which tends toward recovery, by bringing into play the unused reserves of various tissues."

During the past year, the *Journal of the American Medical Association* has published a series of unsigned articles on bacterial vaccine therapy. These articles conclude with the following summarization:

1. Vaccine therapy is a highly specialized field of medicine whose successful pursuit calls for a particular training in bacteriology, immunology, and clinical medicine.
2. The therapeutic possibilities of vaccine therapy have been exaggerated.
3. The promiscuous use of the stock bacterial vaccines of commerce in the treatment of acute and chronic infections is an irrational procedure.

<sup>1</sup> *Journal of the American Medical Association*, May 24, 1913.

4. Ready-mixed commercial vaccines should be abolished.
5. In cases suitable for bacterial therapy, autogenous vaccines are, with few exceptions, superior.
6. Autogenous vaccines should be prepared by those in touch with the patient, and not through the agency of remote laboratories.

**TYPHOID FEVER.** At the present time, the most successfully established vaccine seems to be the typhoid, particularly as a protective agency against typhoid fever. That the belief in the efficacy of anti-typhoid inoculations is not unfounded, is shown by the fact that such inoculations are now compulsory for officers and enlisted men in both the army and navy services. Many Boards of Health are also advising the method and furnishing, free of cost, the necessary material. In addition, many of the laity are voluntarily requesting protective inoculations.

For purposes of protective immunity, the most recent advice is to give three doses of stock typhoid vaccine, the first of 500,000,000, and the other two of 1,000,000,000 each. The inoculations are made at intervals of from seven to ten days. The best time for the inoculation is 4 P.M., or later, in the afternoon, since any reaction will then come after bedtime. The untoward effects are not common, and, when they do occur, are of a comparatively trivial nature. Usually the only complaint made is of some soreness at the site of injection, which may be given in the subcutaneous tissues of the arm, back, or thigh.

In regard to the duration of the immunity conferred by the inoculations, Russell<sup>1</sup> states that it begins to diminish in about two and a half years. The experience in the British Army is that even after four or five years, the rate per thousand among the inoculated is, roughly speaking, only one-fourth that of the unprotected troops. While the vast majority of cases are fully protected, the immunity is not absolute. Russell states that in 1911, among 80,000 persons vaccinated in the army there were 12 cases of typhoid with one death; and in 1910, there occurred 6 cases among the vaccinated with no fatalities. Had it not been for the prophylactic immunization, Russell believes there would have occurred, at the prevailing rates of incidence, about 250 cases.

The great majority of antityphoidal inoculations have been made in adults and comparatively few in children. Russell<sup>2</sup> considers this one of the most promising fields of usefulness of antityphoid inoculation, inasmuch as youth and young adults are the most susceptible elements of the population. He points out that in the registration area of the United States, there were, in 1909, the last year for which complete mortality statistics are available, a total of 3366 deaths from typhoid fever in individuals under twenty years of age, out of a total of 10,722 of all ages, or almost one-third of all deaths from the disease. They

<sup>1</sup> Journal of the American Medical Association, October 12, 1912.

<sup>2</sup> Ibid., February 1, 1913.

were distributed according to ages as follows: Under two years, 97; under three years, 139; under four years, 132; under five years, 110; five to nine years, 647; and ten to nineteen years, 2174. Russell believes that a large proportion of these deaths can, without question, be prevented by the more frequent use of antityphoid vaccine.

He reports on 359 children between the ages of two and sixteen who had been vaccinated by fifty different physicians in many parts of the United States.

The inoculations are made as in adults, that is, after 4 p. m., or later in the afternoon, and at intervals of from seven to ten days. The dosage is based altogether on the body weight and not the age; the child is given that portion of the adult dose which his weight bears to the average adult weight, namely, 150 pounds. If the fraction proves inconvenient, a little more, rather than a little less, is given. No harmful effects were reported in any of the 359 children, and, so far as known, none have contracted typhoid fever, although some of the vaccinations were made over three years ago.

The following tables show that the general reaction is much more often absent or mild in children than in adults, even after the first dose, and after the second and third doses, the difference is more marked:

TABLE IV.—Percentage of General Reactions in 359 Children, Two to Sixteen Years of Age.

Dose.	None.	Mild.	Moderate.	Severe.
First	73.54	24.51	1.67	0.28
Second	86.26	11.99	1.75	0.00
Third	92.56	6.38	1.06	0.00

TABLE V.—Percentage General of Reactions in Adults (128,903) Doses).

Dose.	None.	Mild.	Moderate.	Severe.
First	68.2	28.9	2.4	0.3
Second	71.3	25.7	2.6	0.2
Third	78.0	20.3	1.5	0.1

In another communication, Russell<sup>1</sup> gives the results obtained in the United States Army following the introduction of antityphoid inoculations.

The incidence of typhoid in the United States Army before and after the introduction of prophylactic immunization is shown in the following table:

<sup>1</sup> Journal of the American Medical Association, October 12, 1912.

TABLE VI.—Decrease in Typhoid following Antityphoid Vaccination.

Year.	No.	Cases.		Deaths.		Vaccinated persons.	
		Ratio per 1,000 mean strength.	No.	Ratio per 1,000 mean strength.	Cases.	Deaths.	
1901	552	6.74	72	.880			
1902	565	6.99	69	.850			
1903	348	5.14	30	.440			
1904	280	4.77	20	.330			
1905	193	3.39	17	.290			
1906	347	6.15	15	.260			
1907	208	3.87	16	.290			
1908	239	3.20	24	.310			
1909	282	3.35	22	.260			
1910	198	2.43	14	.170			
1911	68	0.82	8	.097	12	1	
1912 <sup>1</sup>	7	0.20	1	.003	3		

In reply to those who are luke-warm adherents of antityphoid inoculations in civil life, Russell points out that it has been repeatedly shown that the incidence of typhoid fever is higher in hospitals than in the cities in which hospitals are situated. Nurses and hospital employees, and all others who in any way come in contact with the sick, should be immunized, since typhoid, like other exanthematas, is contagious during the proximal stage.

So, too, those living in industrial villages, mining towns, and isolated communities, should be inoculated, as the typhoid death rate in such places is above the average. Spooner<sup>2</sup> reports on three years' experience with typhoid inoculations in training schools for nurses in Massachusetts. Inoculations were given to nurses and others intimately exposed to the disease in 23 hospitals. The result of these inoculations is shown in the following tabulation:

Individuals inoculated in hospitals	1361
Individuals uninoculated (but exposed) in same hospitals	674
Cases of typhoid among the inoculated, excluding 3 who were inoculated during the incubation period (one of these was a paratyphoid infection)	3
Cases of true typhoid among inoculated	2
Cases among the uninoculated (9 of these were paratyphoid cases)	17
Cases of true typhoid among uninoculated	8
Morbidity among inoculated (per cent.)	0.15
Morbidity among uninoculated (per cent.)	1.19

As a result of his experience, Spooner concludes that frequent injections of small amounts of a low-virulence vaccine cause slight inconvenience.

<sup>1</sup> Ratio for 1912 based on experiments for first half year.

<sup>2</sup> Journal of the American Medical Association, October 12, 1912.

They seem to produce a protection among nurses, who are eight times more liable to the disease than the average individual. Their morbidity, under ordinary conditions, is 1.4 per cent., or 19 cases among 1361. Only 2 cases developed under these conditions.

Case morbidity among uninoculated in these hospitals is nearly nine times greater than among the inoculated subjected to similar conditions. No permanent untoward effects have risen from over 5000 injections. The blood picture indicates a certain protection, lasting at least two and a half years.

Spooner also reports on the result obtained by inoculations in the presence of an epidemic in a small village. The village contained 200 inhabitants, and the epidemic arose from the fact that the water supply of a limited number of the people became contaminated from the excreta of an individual who had died of typhoid fever six months previously. The primary cases (17) developed the disease simultaneously, and within a week 29 of the remaining 48, who had been exposed to the disease through the water-supply, had been inoculated. 19 remained uninoculated. Among the latter, 5 cases developed, among the former, but one. The latter presented symptoms immediately following the first inoculation; the disease was very mild.

Spooner states that inoculations made in the presence of an epidemic must be done with care, since it is inevitable that many must be inoculated during the incubation period. His experience was that while the onset of the symptoms may be hastened, the infection was shorter and of a less severe character.

Ravenel, in discussing Spooner's paper, confirmed the statement that the attack was milder in those who had been partially vaccinated, or in whom infection had already taken place, when the vaccination was done.

Weston<sup>1</sup> states that it is an accepted fact that typhoid fever is endemic in institutions, and that, at times, it is epidemic. Because of this, it was determined in the Insane Asylum with which he is connected to immunize all patients under fifty years of age.

In all 2694 inoculations were made, 3 in each case at intervals of ten days.

Largely owing to the success which has attended protective inoculations, and also because it has been noted that cases which have been vaccinated during the incubation period are apt to have the disease in a mild form, antityphoid inoculations have been advised in the treatment of the disease itself. Up to date there is no great amount of evidence that this procedure will prove to be universally applicable.

The therapeutic dose is less firmly established than that used for protective purposes. It varies from 50,000,000 to 1,000,000,000, according to the experience of different observers.

<sup>1</sup> Journal of the Medical Association, October 26, 1912.

Cellison<sup>1</sup> concludes that: (1) Vaccine treatment in typhoid fever will reduce the percentage of deaths and lessen the number of relapses. (2) Complications are less frequent in vaccine-treated cases, and the original attack seems to be shortened in some of the cases. (3) To give the best possible results, vaccine treatment should be instituted as early as it is possible to make a diagnosis, before the patient is exhausted, and complications intervene.

Randolph<sup>2</sup> reports 6 cases of severe typhoid fever treated with increasing doses of killed cultures of typhoid bacilli. He gave from 200,000,000 to 1,000,000,000 bacilli at each dose, the interval being three days, except in one instance in which it was but two days. The patients became afebrile in from nine to eighteen days from the beginning of the treatment. The patients also seemed to suffer less local and constitutional reaction in the height of the disease than in the defervescence. Two desperately ill patients, one with a double pneumonia, died. Randolph believes that the treatment is a beneficial one, and that the earlier it is instituted the better the results.

WHOOPING COUGH. Bamberger<sup>3</sup> reports 6 cases of whooping cough in which vaccine treatment was used. The children ranged in age from one to four years. The vaccine was prepared from deep swabbings of the throats of children having pertussis, each cubic centimeter containing 20,000,000 dead organisms. The cultures were plated and repeated until a pure culture was obtained; the vaccine was then made from several strains of the bacilli, so that it is polyvalent in character.

The vaccine was injected hypodermically every other day in the gluteal region in doses of 20,000,000 bacteria. There were no untoward effects.

Bamberger concludes that: (1) The treatment seems rather to lessen the severity of the disease than to shorten the duration markedly, although only 2 of the cases lasted as long as six weeks.

(2) The sooner the treatment is begun, the better the results. Bamberger believes that large doses (500,000,000) given every day would probably be better than smaller ones, as by so doing, the course of the disease could be cut short.

Zahorsky<sup>4</sup> also thinks the vaccine is of value in the treatment of pertussis. He advises from 30,000,000 to 50,000,000 bacteria every three or four days in infants from the onset of the disease, but in older children at its height.

PNEUMONIA. Bispham<sup>5</sup> reports a series of 19 cases of pneumonia, 6 of which were treated symptomatically, with 2 deaths, and 13 treated

<sup>1</sup> American Journal of the Medical Sciences, September, 1912.

<sup>2</sup> Washington Medical Annals, March, 1913.

<sup>3</sup> American Journal of Diseases of Children, January, 1913.

<sup>4</sup> Interstate Medical Journal, October, 1912.

<sup>5</sup> Military Surgeon, June, 1913.

with vaccine with no deaths. No attempt was made to employ auto-gogenous vaccine as the heterogenous variety proved so satisfactory.

The vaccine was administered in increasing amounts, 50,000,000, as a rule, for the initial dose, although in sthenic cases as much as 150,000,000 may be given. The second day 100,000,000 are given, 200,000,000 on the third day, etc. As soon as the diagnosis is made, the initial dose is given. On the following day, if the patient shows improvement, no treatment is needed, but if the temperature remains high, and the case is sthenic, the dose is increased. If there is no abatement of symptoms on the third day, the dose is still further increased. The treatment should be started as soon as the diagnosis is made.

Bispham states that the immediate fall of the temperature after each injection, together with the great relief from the distressing symptoms, such as pain and dyspnea, was very marked.

"COMMON COLDS." Fisher<sup>1</sup> states that "colds" can be aborted, or their course shortened by means of vaccines.

As an adjuvant in the treatment of asthma and chronic bronchitis, Pirie<sup>2</sup> has had good results from the use of vaccines.

RHEUMATISM. Schafer's vaccine or phylacogen, as it is now generally known, has been the subject of bitter controversy. It is characterized, on the one hand, as a shot-gun mixture, unscientific in its conception, and entirely empirical in its use. On the other hand, there are many clinical reports testifying as to its efficacy. Even if it is unscientific, and given empirically, this is not of great consequence, if it can be shown that, first, it does do good, and, secondly, that it is without danger.

While there are now a number of so-called phylacogens (gonorrhoea phylacogen, erysipelas phylacogen, etc.) on the market, the original (Rheumatic Phylacogen) was introduced in the treatment of acute or chronic rheumatism. Stone<sup>3</sup> objects to the use of Schafer's vaccine because the etiology of both acute and so-called chronic rheumatism is at present unknown and that to inoculate individuals with heterogenous mixtures of bacteria with the hope of benefiting cases of chronic arthritis of unknown origin is unjustifiable.

The injection of phylacogen is not infrequently followed by a chill often severe in character, and at times by delirium, as in a case reported by McLean<sup>4</sup> in which death is believed to have resulted from the use of Schafer's vaccine, but there is no proof of this.

Metcalf<sup>5</sup> reports on the successful employment of phylacogens in

<sup>1</sup> Boston Medical and Surgical Journal, June 5, 1913.

<sup>2</sup> British Medical Journal, June 7, 1913.

<sup>3</sup> Journal of the American Medical Association, February 15, 1913.<sup>4</sup>

<sup>4</sup> Ibid., February 22, 1913.

<sup>5</sup> Boston Medical and Surgical Journal, June 26, 1913.

various conditions. He believes that a large percentage of cases of infectious arthritis, in both the acute and chronic phases, can be relieved or cured by the treatment. There can be no doubt that in a large number of cases it has acted very satisfactorily.

**Veronal.** House<sup>1</sup> calls attention to the fact that the use of veronal is steadily increasing, and that, in addition, its use is being more and more abused, in that physicians are employing it in a variety of conditions, and the laity asking for it from druggists, who freely dispense it. In recent years, House has used veronal more sparingly than formerly. He now restricts its use to the *insomnia* and *nervous restlessness* which accompany nervous disorders.

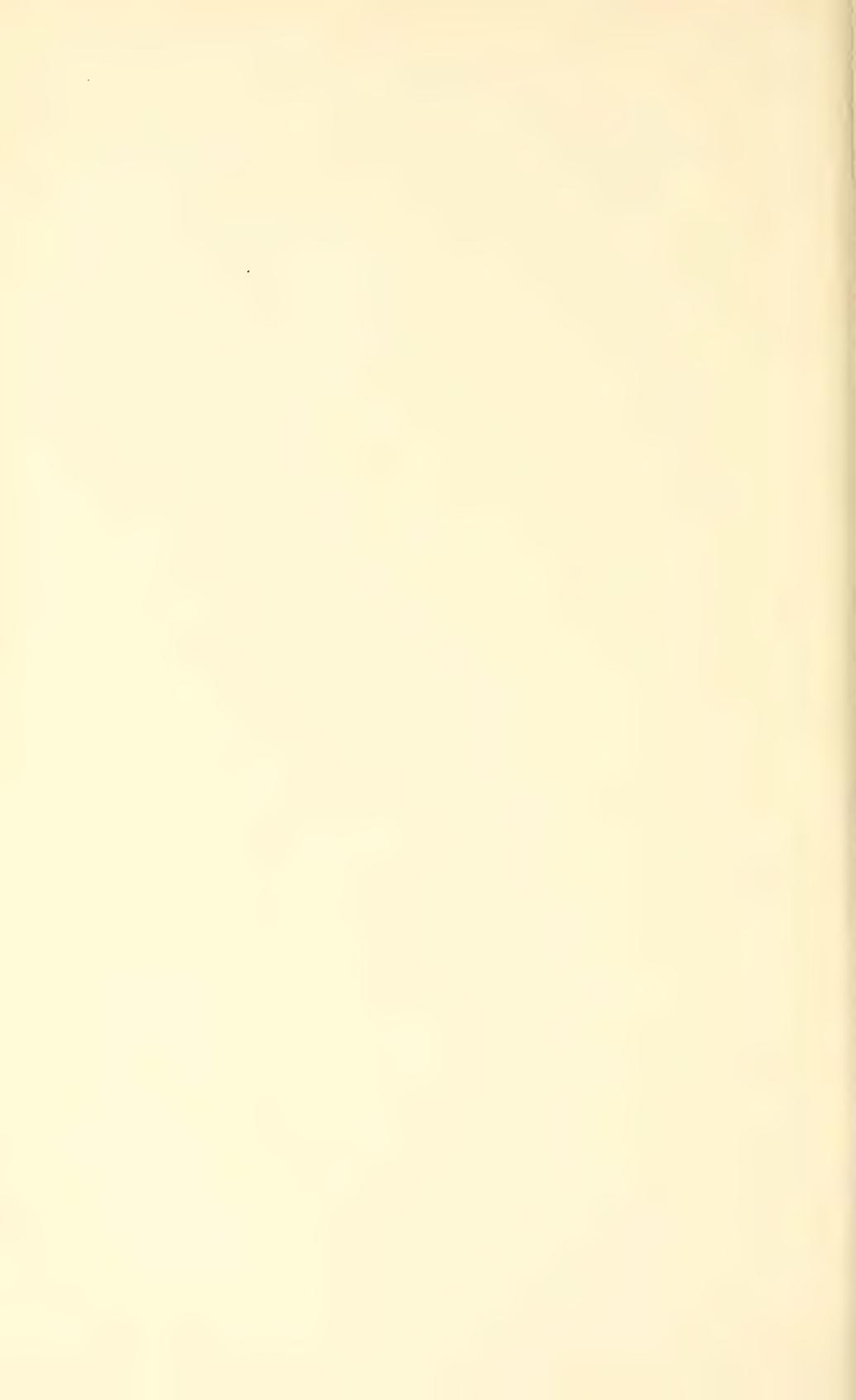
The best results are obtained by prescribing the drug in powder form. House objects to the use of tablets, as he never has obtained good results from them.

For the relief of simple insomnia, 5 to 12 grains of veronal may be given, divided if preferred, part being given at five or six o'clock, and the balance on retiring. For sedative purposes, 5 grains may be given every four to six hours during the day, and double that amount at bedtime. The maximum amount should not exceed 30 grains in the twenty-four hours. Hot malted milk serves as the best vehicle, as it disguises the taste, acts as a solvent, is of itself sedative to many persons, and in addition serves to conceal the quantity administered. As a substitute, hot water or weak tea may be employed. To those who suffer from vertigo, and slight headache after taking veronal, House states that von Noorden recommends a reduced dose of the veronal and the addition of three grains of phenacetin. The drug may in certain instances be taken for months without producing symptoms of intolerance. The symptoms which indicate that veronal had best be discontinued are vertigo, weakness and staggering, puffy eyelids, and above all else, dark, concentrated urine.

If poisoning from veronal is suspected, no hot drinks should be given, as they will hasten absorption,—the stomach tube should be used, external heat applied, and caffeine given.

A number of deaths have been reported, but they have been after the ingestion of large doses, usually above 100 grains.

<sup>1</sup> Therapeutic Gazette, May, 1913.



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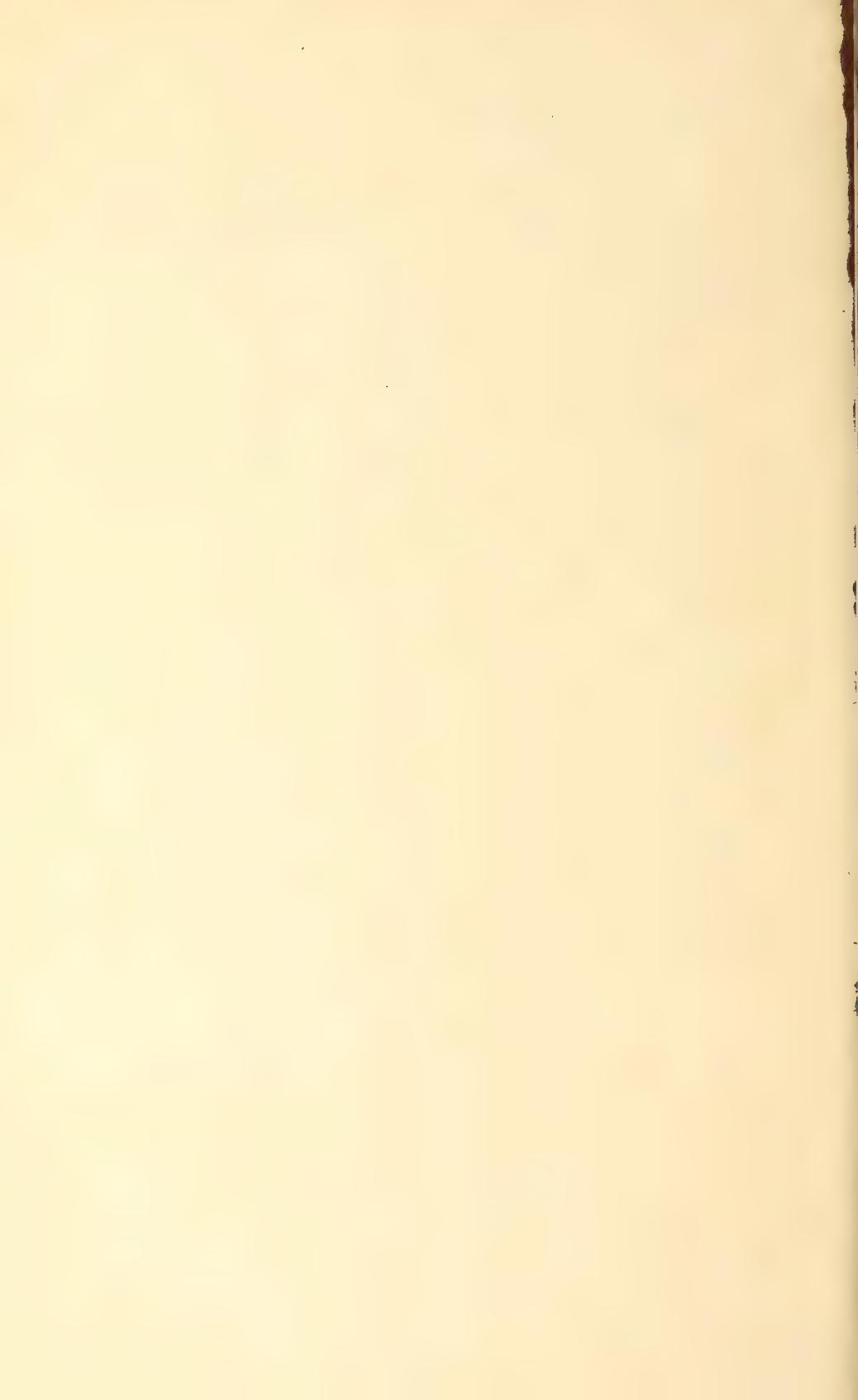
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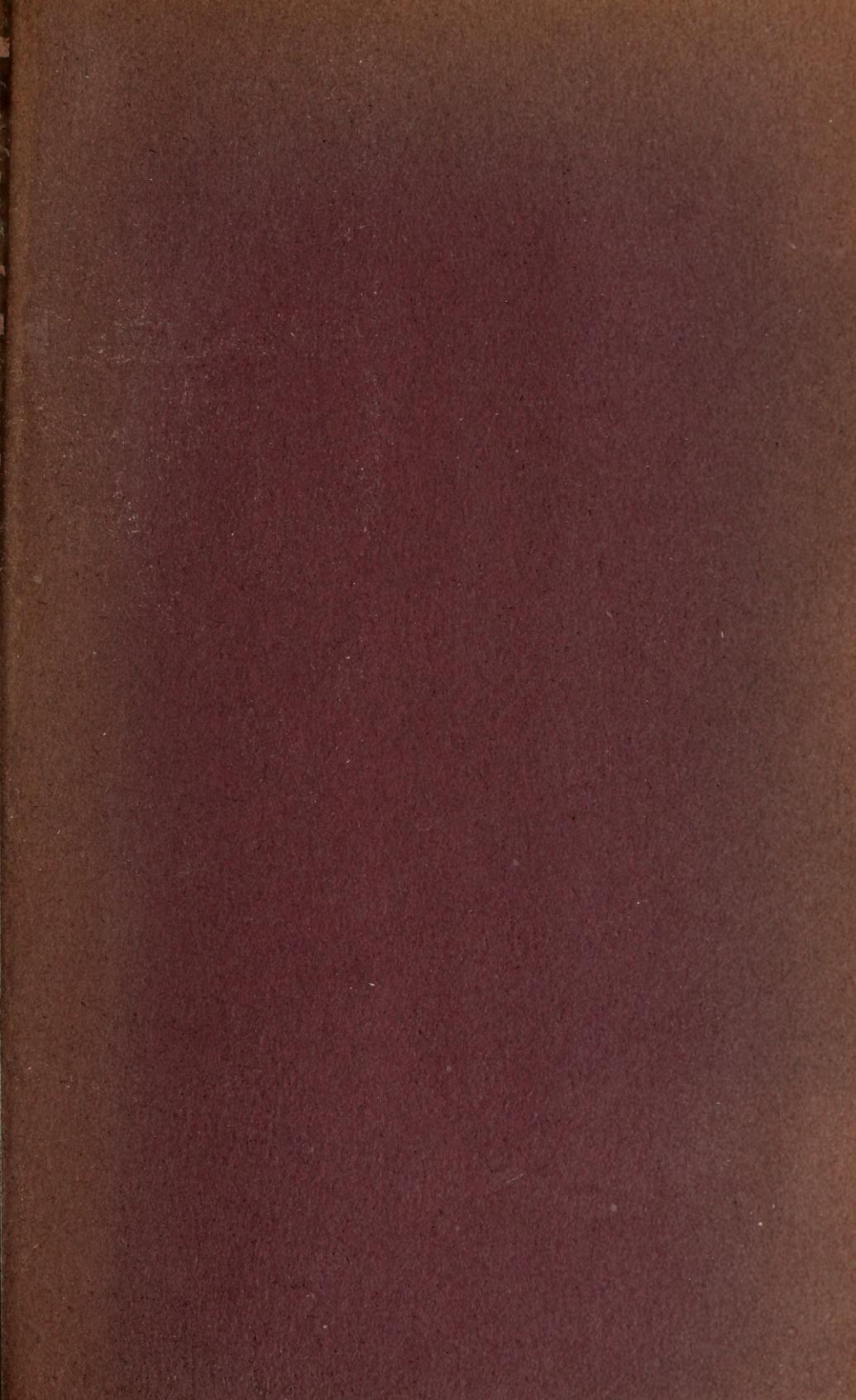
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